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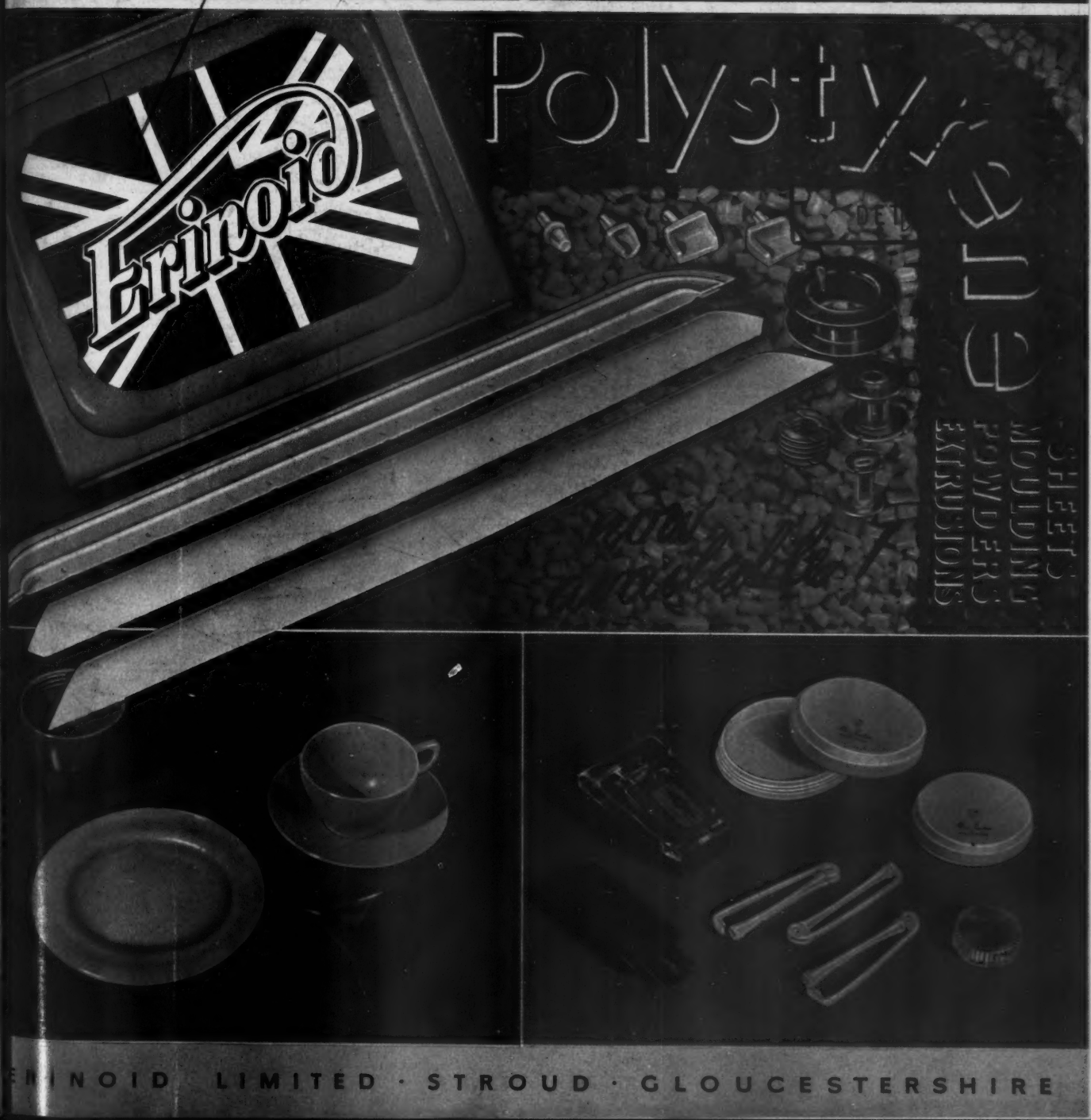

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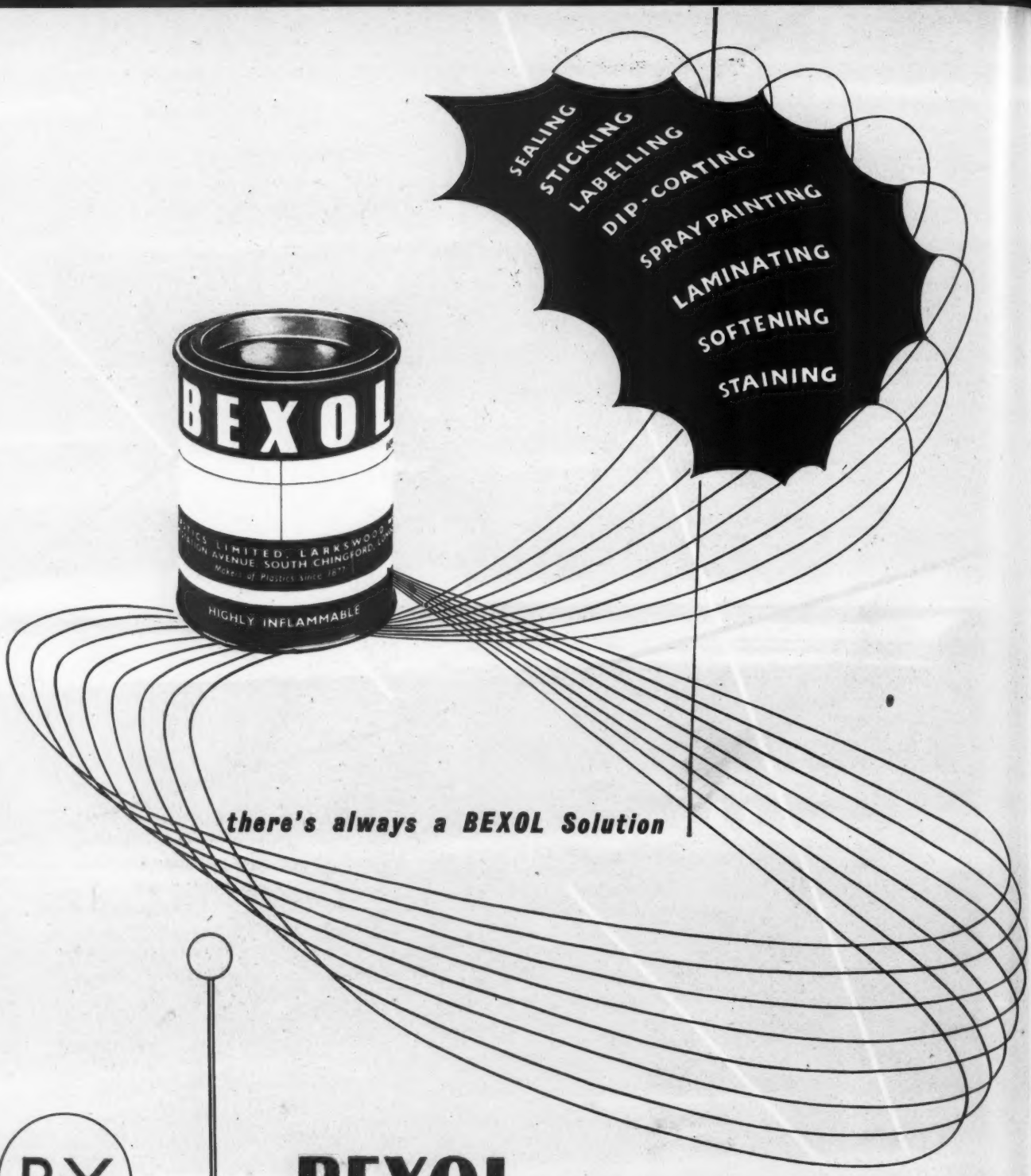

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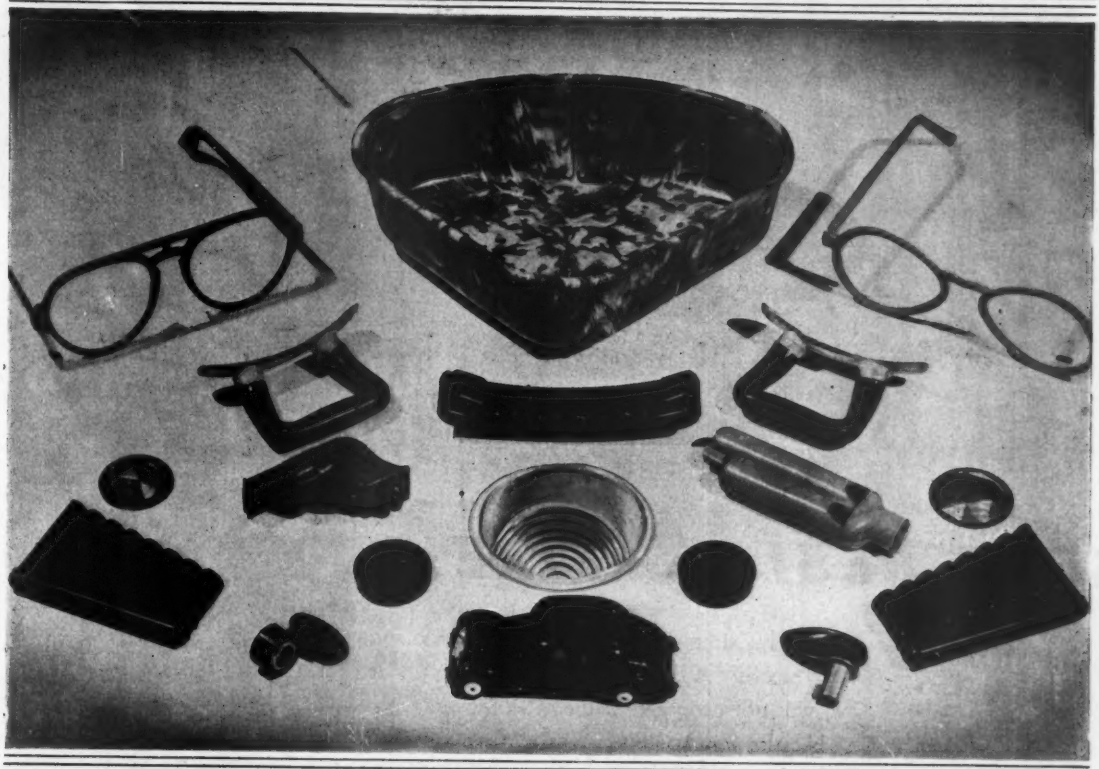

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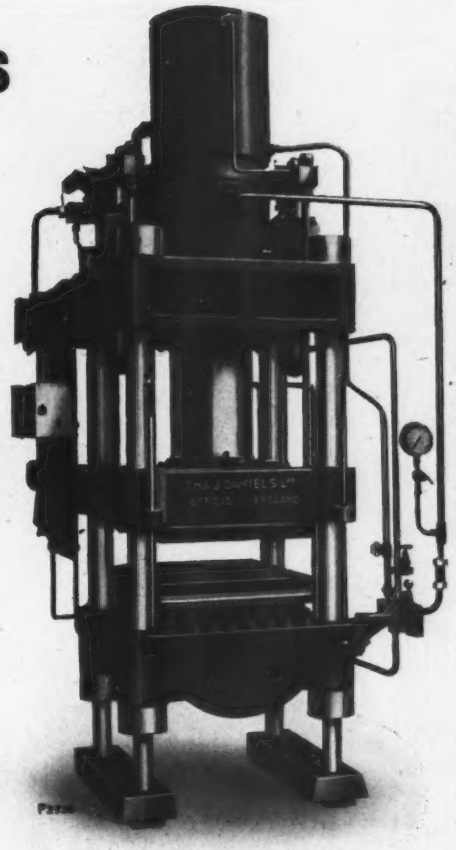

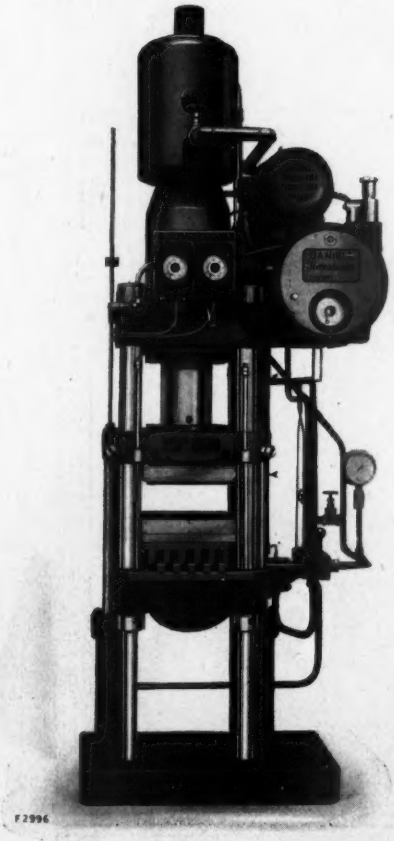

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* (Above) Daniels 150-ton Downstroke Press with self-contained pump unit, piston valve and electric platens.

Main ram stroke	18"
Platen size	26" x 26"
Daylight between platens (with stool)	24"
Pump motor	5 h.p.

(Left) Daniels 50/75-ton Downstroke Press with self-contained pump unit, piston valve, electric platens, Daniels Process Timer and slowing device, which retards the final closing speed of the press to avoid damage to the mould.

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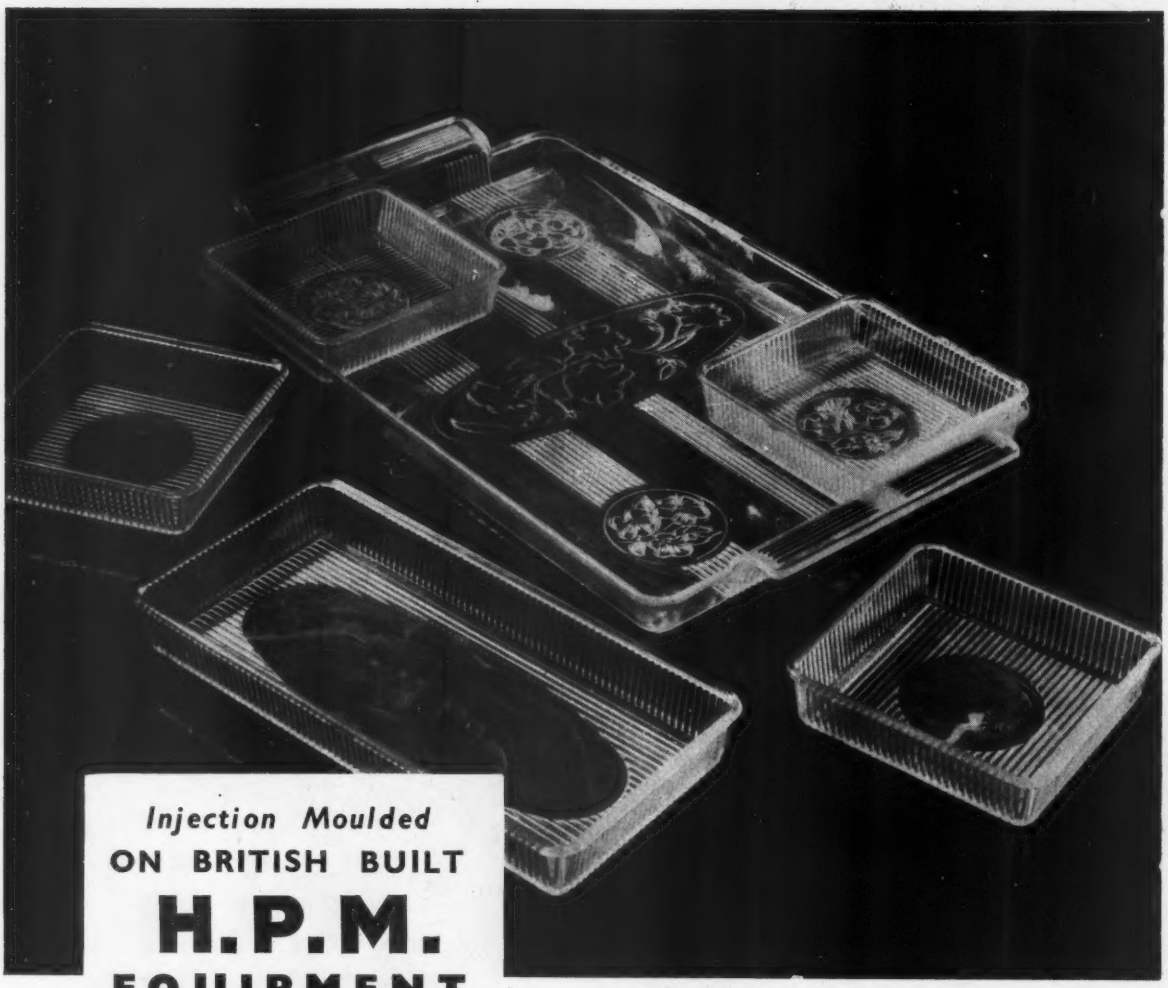

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EQUIPMENT

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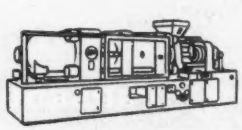
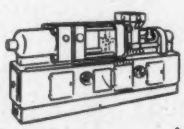
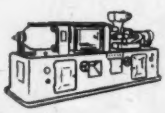


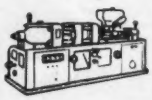
60 ounce



32 ounce



16 ounce



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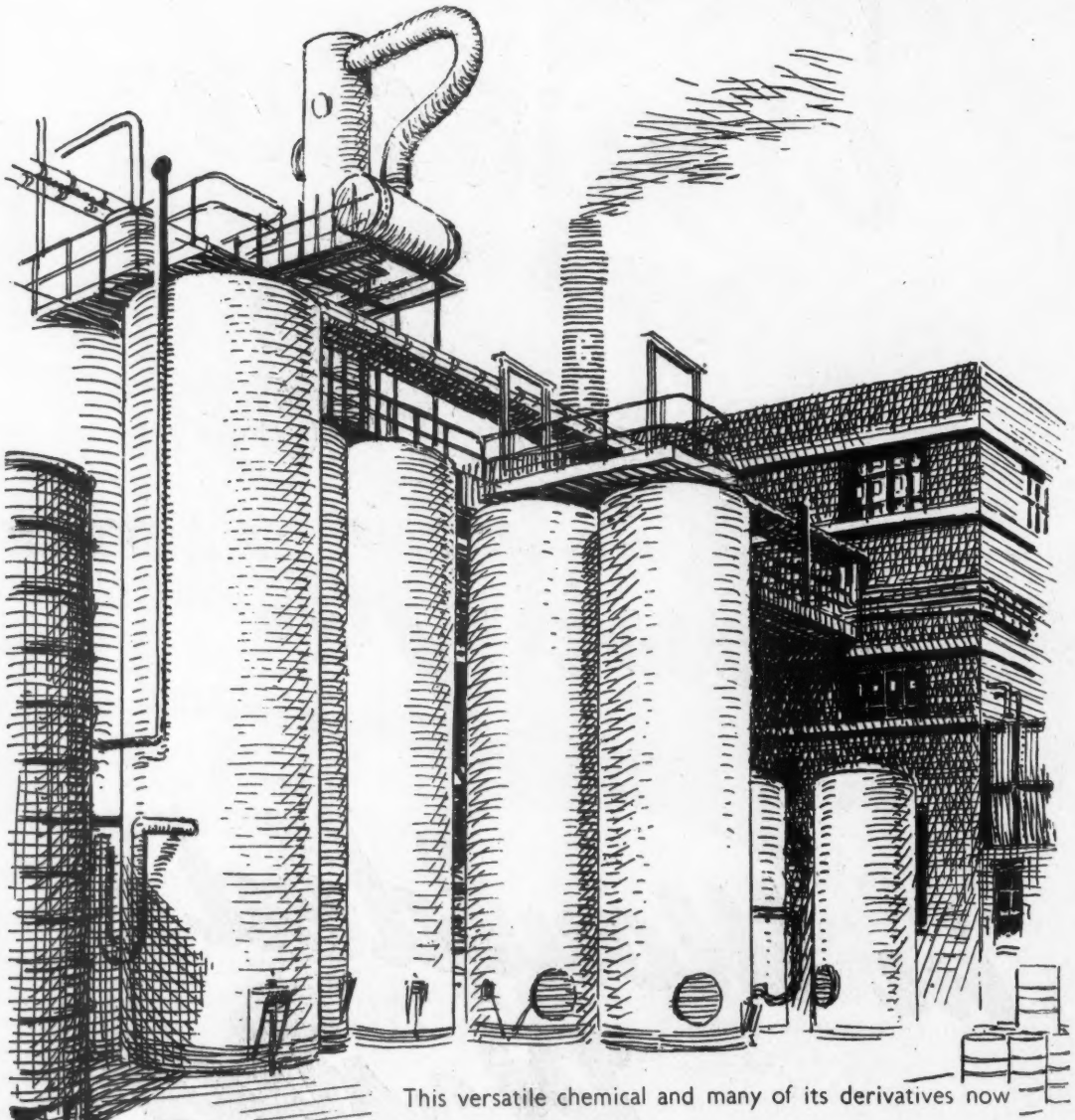

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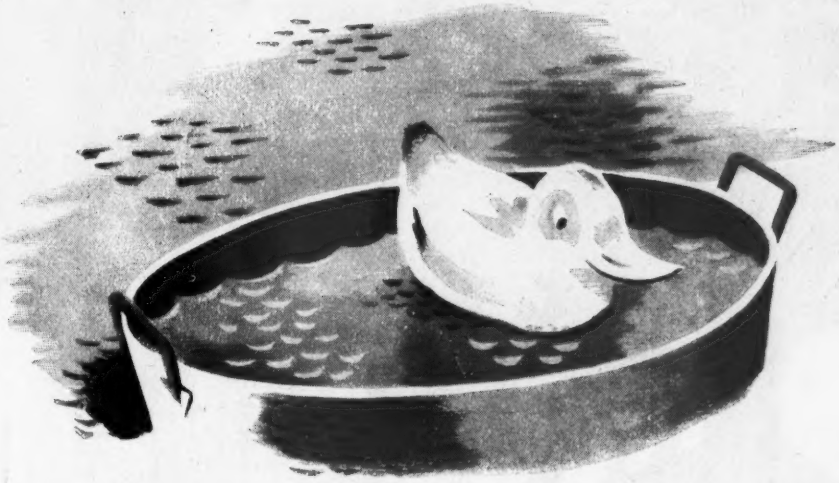

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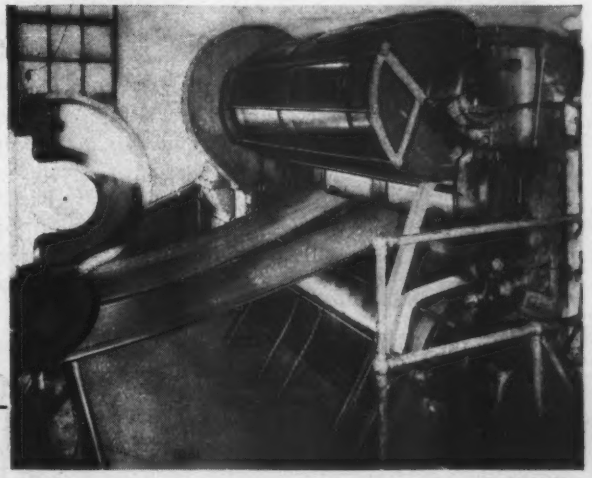

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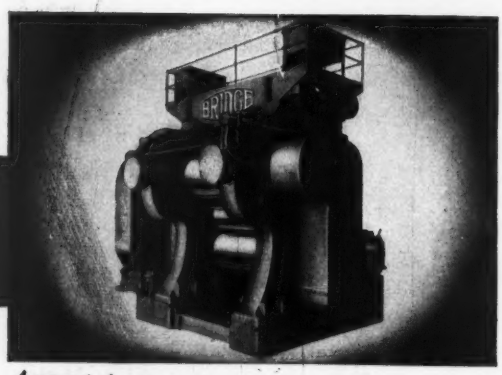

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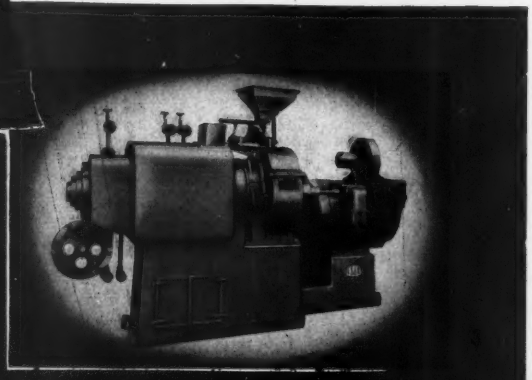

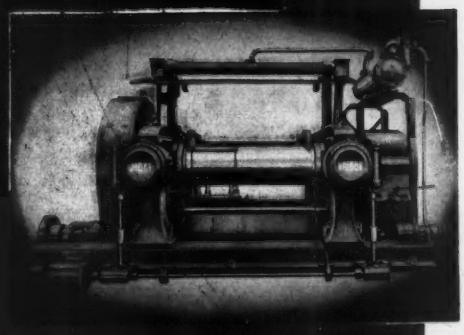

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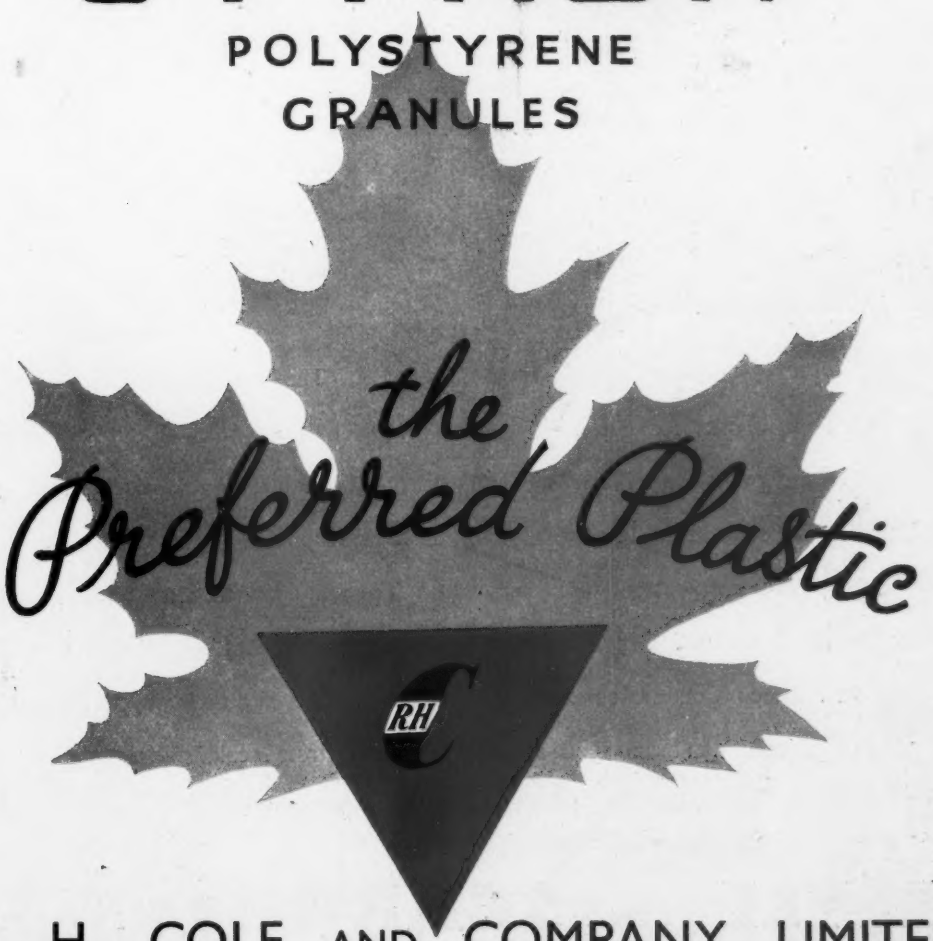

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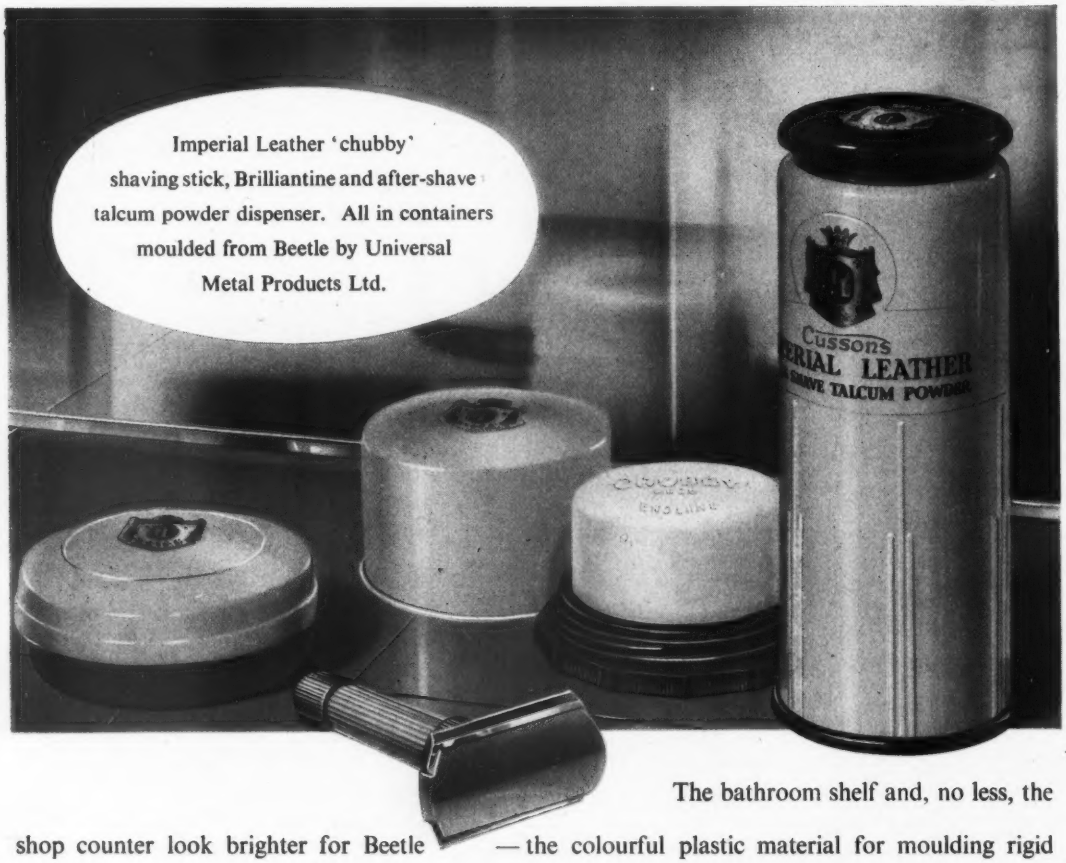
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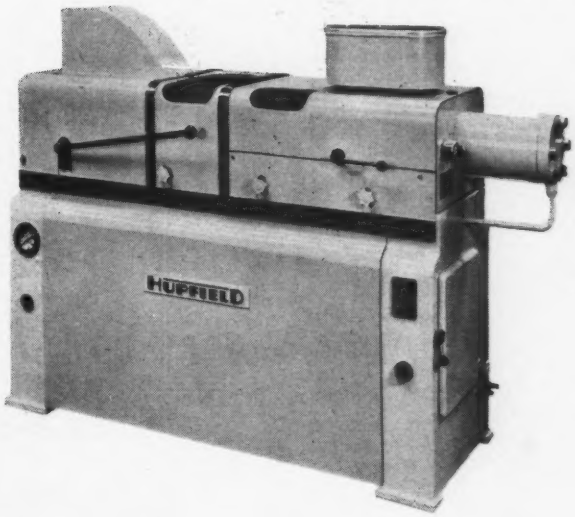
Plasticizing capacity per hour	9 lb.	18 lb.
Injection pressure	5½ tons	11 tons
Mould locking pressure ..	22 tons	44 tons
Shots per hour, subject to mould design	350	250



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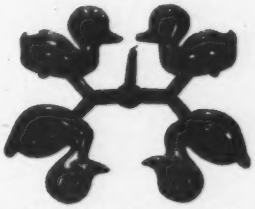
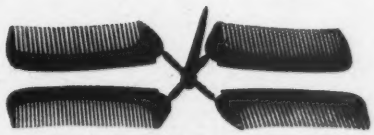
25 seconds. 1 ounce.



cellulose acetate 5½" × 5"
30 seconds. 31 gramme.



polystyrene 8" × 3½"
20 seconds. 24 gramme.

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APRIL 30—MAY 11
CASTLE BROMWICH
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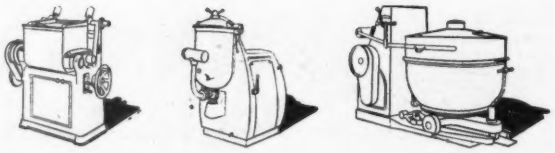

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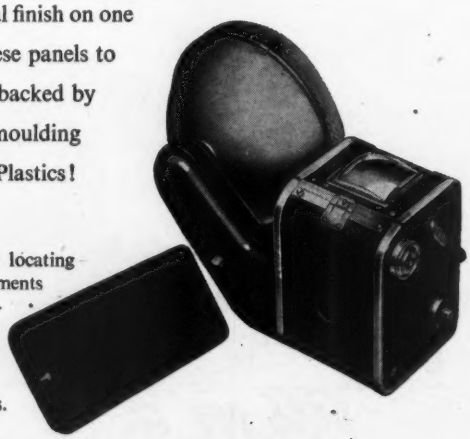
Photo Finish!

In moulding, as in photography, accuracy is everything. This new Kodak 'Duaflex' camera, for instance, utilizes plastic side panels, a feature of which is the grooving system that locates and holds various components. The essentials are permanent accuracy and rigidity, plus a special finish on one side. Kodak Ltd. entrusted the job of producing these panels to Ekco Plastics, in whose wide knowledge and experience, backed by facilities for quantity production, lies a ready answer to every moulding problem. If *you* have a moulding problem consult Ekco for Plastics!



The side panels are robust black phenolic mouldings incorporating locating grooves for spool chambers and holders, mirror, reflex, lens, film compartments etc. This side of the moulding was given a matt finish by dull chromium-plating the tool. Extreme accuracy was necessary in the design and making of the moulding tools and great care had to be exercised during and after moulding to prevent warping.
The Lens Cover and Flasholder were also moulded by Ekco Plastics.

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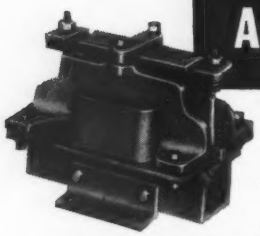

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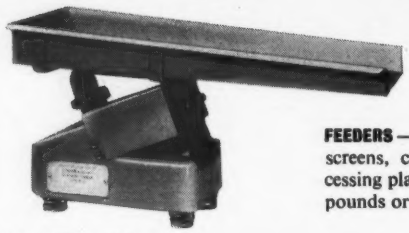

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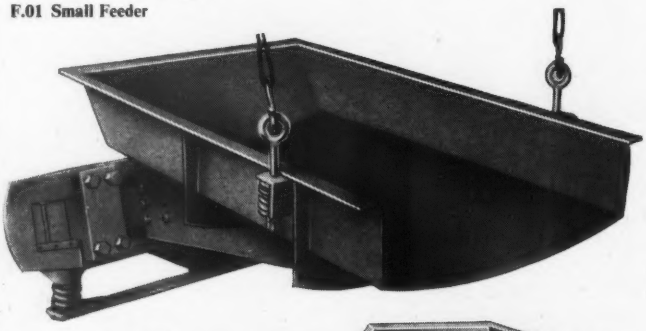

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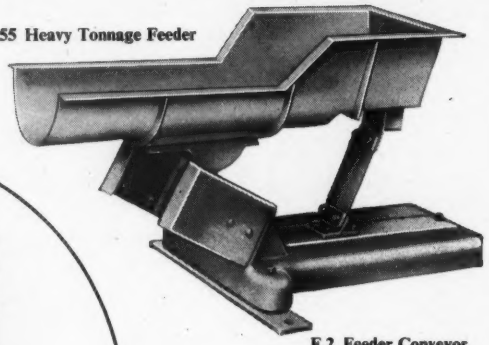

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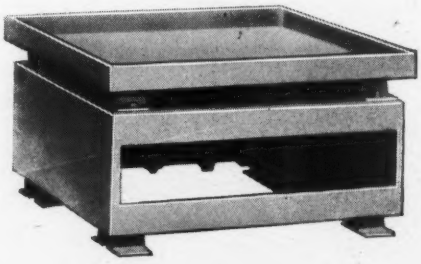

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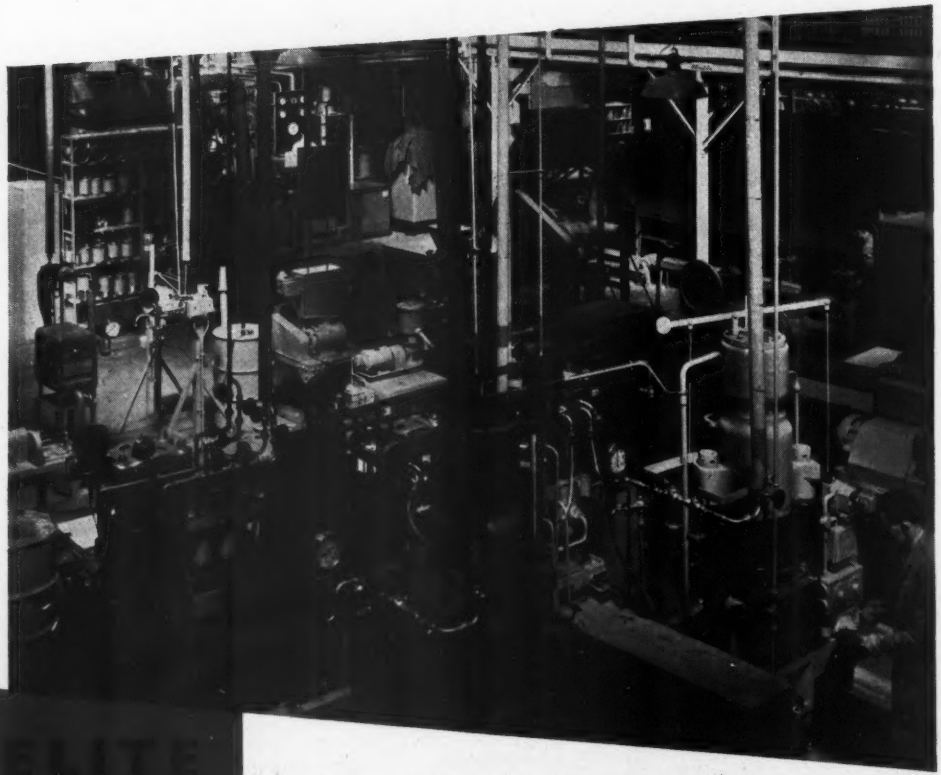

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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

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EDITOR: M. D. CURWEN, B.Sc., A.R.I.C.

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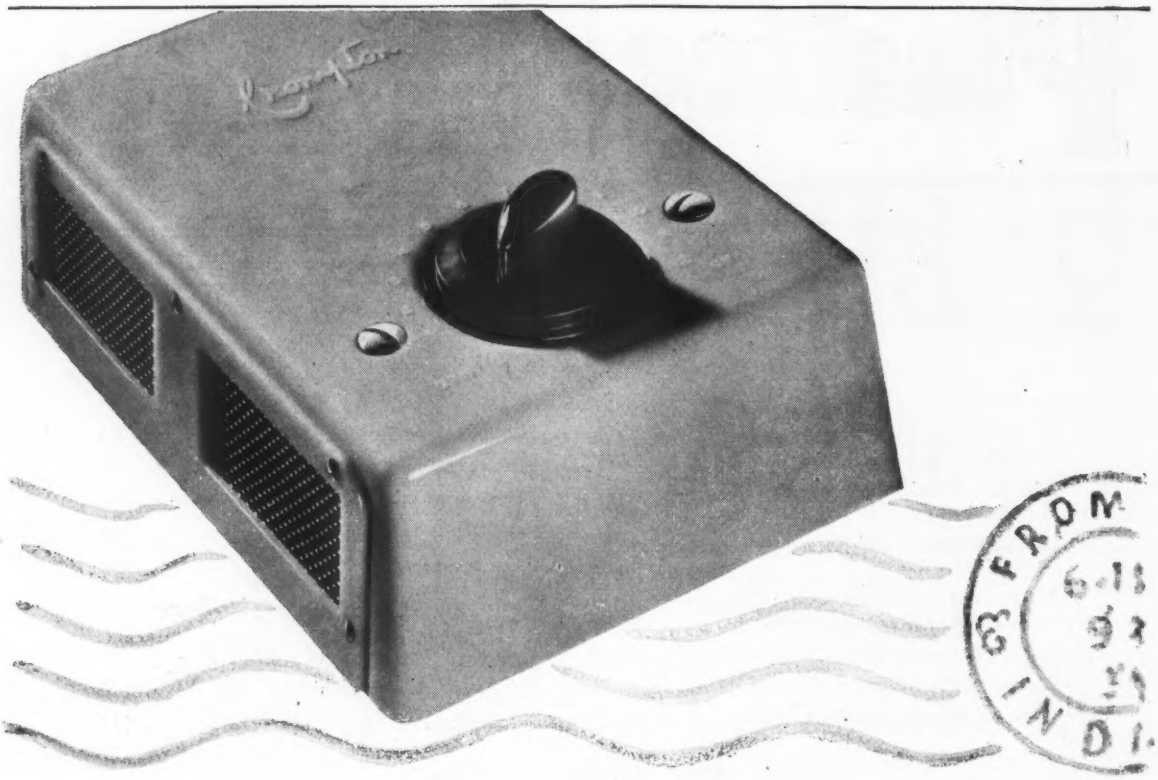
Slicing cellulose acetate at the works of British Celanese Ltd. The movable carrier bearing the block of cellulose acetate slides forward and the knife slices off a sheet to the required thickness—from 5/1000 in. up to 6 mm. (Courtesy, *British Celanese Ltd.*)



FAN-MAIL FROM INDIA

The parts of this Crompton-Parkinson fan regulator housing have to be moulded within carefully defined limits and a high finish is required of the external components. Although it represents a straightforward compression moulding job, details such as the ingenious design of the air vent claim attention. This consists of wire gauze held between two moulded plates, the whole being assembled as a single unit. In addition to the housing and control knob, there is an internal contact plate having metal inserts.

These mouldings, simple in themselves, nevertheless underline Streetly RELIABILITY. We have been moulding them for Crompton-Parkinson Ltd. for 13 years, during which our customer has received many thousands of orders from India and the Middle East. During that long period our own high standard of moulding and finishing and meticulous system of inspection have contributed significantly to our customer's own smooth production. Even if we mould a small percentage of rejects (and who doesn't), the customer never sees them. *We* weed them out, *before* delivery.

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Plastics

VOL. XVI. No. 165 APRIL, 1951

" In Scotland the stems [of the seaweed known as Sea Wand] are sometimes put to a rather unexpected use—the making of knife-handles. A pretty thick stem is selected, and cut into pieces about four inches long; into these, while fresh, are stuck blades of knives, such as gardeners use for pruning and grafting. As the stem dries it contracts and hardens, closely and firmly embracing the hilt of the blade. In the course of some months the handles become quite firm, and very hard and shrivelled, so that when tipt with metal, they are hardly to be distinguished from hartshorn."

R. K. Greville, " Algae Britannicæ, or Descriptions of the Marine and other Inarticulated Plants of the British Islands," 1830.

EDITORIALS

Plastics Supplies

WE do not remember having received a letter that cheered us up more than does Mr. John Harvey's which we publish on p. 92. As managing director of Erinoid, Ltd., one of our producers of polystyrene and other moulding materials, his rapid action, before our publication last month of Mr. Punfield's letter, denotes courage and a sense of realism so necessary at this stage of the industry's existence. We are sure that this action (we understand that other manufacturers have taken similar steps to eliminate black-marketing) will have warmed the hearts of all who make the welfare of the industry their real concern.

Nobody pretends that it will solve the whole problem. Most materials are still, and will be for a long period, in very short supply. Furthermore, the Government still insists with good reason on maintaining as high a rate of exports as is possible. What we do hope it will prevent is the unfair diversion of any part of that quantity of material made in this country which is, in fact, the moulder's allocation. He should not be submitted to an iniquitous poll-tax to line the pockets of the black-marketeer, whose sole " recommendation " is that the said pockets are still bulging with bank-notes derived from his adventures in 1947-8-9. What seems to us so serious is that some of these deals have been carried out with a knowledge of plastics and of the plastics industry that is at no mean level.

The matter of controls and the raw materials position have been studied carefully at the British Plastics Federation meetings, and in this connection it is worth while noting some of the remarks of the chairman, Mr. P. A. Delafield, at the sixteenth annual general meeting on March 21. " There has been very naturally," he said " a great deal of gossip and talk about controls and also about plastics materials coming into their own as substitute, or replacement materials to use a better word, for the older traditional materials of construction such as non-ferrous metals. Concerning the first point, I believe I am right in saying that the general view of the authorities is that detailed end-use control, which is the only effective way of controlling things, is quite useless for the plastics industry, unless complete control of a war-time nature is established for the whole of the chemical and allied industries.

" I, personally, do not think that the time has come to call on industry to man such a type of control and, in saying this, I stress the fact that industry would have to do the manning for obvious reasons.

" Concerning the second point that plastics are a universal stop-gap for shortages of other materials, we all in this industry know that, broadly speaking, this is not practical. Not only do our own raw material shortages present us in this industry with a host of problems, but in addition the shortages of other materials which are married to ours in order to produce the final result, whether, for example, it be a telephone, a bushing, an aeroplane or a motorcar, are presenting parallel problems to the whole of British industry.

" It is necessary therefore, in my opinion, to keep calm and, whilst pursuing our own business as actively as possible, await results of the efforts of our raw materials mission in Washington."

The last paragraph is good advice and we sincerely hope that, as we said in our last issue, the Washington talks will resolve in part our problem—we are the largest chemical manufacturing country in Europe, and if we are to play our legitimate role in the forthcoming rearmament programme, this fact must be clearly understood. The latest news that Great Britain is to be given an " advance " allocation of 19,000 tons of sulphur for making sulphuric acid (without which our plastics manufacture would suffer even more than it is at present) is perhaps a realisation of the part we play in world affairs.

More Raw Materials

THE news given on page 103 in this issue that the British Oxygen Co., Ltd., is about to launch large-scale manufacture of melamine, is a direct reflection of the assurance with which the future of melamine resins and moulding compounds is regarded. It is as well to point out, however, that the B.O.C. will not manufacture the resins or powders, but will concern itself only with the production of the raw material melamine from the carbide which it already employs for producing acetylene. It will leave to other manufacturers the process of combining it with formaldehyde to produce the materials for the plastics industry.

Many of our moulders have had a long and wide experience of melamine and have been producing cups, saucers and plates for some years. The general concensus of opinion is that, in the field of domestic ware, especially " crockery," it is the " ideal " material so far—the logical step from the urea moulding materials which have had, and still have, so deserved a success in the field of picnic sets for about 20 years. High resistance to moisture and water, and resistance to heat (hot food can be placed on melamine plates without deleterious effect), in addition to beauty of colour and texture, make such tableware acceptable to the housewife.

Their importance in this field, and their wide popularity in the U.S.A., is such that a specification for melamine table-

ware, recommended by the Society of the Plastics Industry, has been passed and is now issued by the U.S. Department of Commerce. What is most interesting is that it has been compiled for use by the purchaser, more especially the retail distributing trade. With the permission of the Society, we have pleasure in reproducing it in full on page 91.

We have stressed the tableware market for obvious reasons, but the moulding powders are also important for producing mouldings of high mechanical strength so that, coupled with their other properties of resistance, we find them used for producing washing-machine agitators, etc. The resins themselves have long proved to be of value as bonding materials for laminates and in paints and varnishes.

Production of melamine itself by the British Oxygen Co., Ltd., will be of the order of 2,000-,3,000 tons per annum, an important and welcome addition to the supplies already emanating from British Industrial Plastics, Ltd., who began melamine resin manufacture some 10 years ago.

We also have news to the effect that Erinoid, Ltd., James Nelson, Ltd., and the Hercules Powder Co., Ltd., of London, have become partners in a new enterprise to manufacture high-grade cellulose acetate in this country. A factory has been erected at Lancaster and production will be absorbed by James Nelson, Ltd., for rayon spinning, by Erinoid, Ltd., for moulding powders, and by the Hercules Powder Co., Ltd., for sale as acetate flake.

British Plastics Federation

WE have received the annual report of the Chairman and Council of the British Plastics Federation for 1950, a report which reflects the great amount of work carried out by the various technical and other committees and the staff of the Federation.

Of first importance in this work is that section dealing with standardization, a quality yard-stick on which the future of the whole industry depends. In addition to revision of existing specifications, work has been continued or started on flame-resistant p.v.c. sheeting, p.v.c. compounds for water pipes and food purposes, thermoplastic tube, laminated sheet, polystyrene wall tiles, moulded trays, design of inserts for mouldings, etc.

The Federation's Publicity Committee has grown in strength, especially in its contacts with the daily and technical press and with the B.B.C. A special publicity committee has prepared an educational brochure on p.v.c. sheeting which has been issued to wholesalers and chain stores. It describes the properties of p.v.c. sheeting and how it should be treated by the public.

MOULDING POWDER AND SHOT

Whilst visiting the offices of one of my moulder friends last month, he showed me a quarto sheet of paper with a typewritten list of prices and quantities available of moulding powders and plasticizers. The first item was: "100,000 lb. polystyrene . . . 5s. 7d. per lb." The list was as long as my foot and no doubt every moulder has received a copy. My friend informed me that it was handed to him by an individual as I saw it—a typewritten sheet without either name, address or telephone number; all this, presumably, based on the excellent army principle of "no name, no pack-drill." When my friend asked for this information, generally so useful when carrying out business transactions, he was met by a blank stare and the reply that a personal visit would be made once a week. To my simple mind, I should imagine payment of such transactions would make an interesting study. Another friend tells me that he was offered di-octyl phthalate at 9s. 6d. per lb.

Cloak and Dagger

* * *

Dr. N. J. L. Megson tells me he has left the Advisory Service on Plastics and Rubber, Ministry of Supply, to take up the post of Head of the Chemistry Department, Royal Aircraft Establishment, Farnborough, Hants. In congratulating him on his new job, I should like to say how much I, and I am sure all the members of the plastics industry, will miss him. There were few who gave so much unstinted advice from an exceptional store of knowledge on plastics to anybody who asked for it. Perhaps his transfer to Farnborough means the growth of an even greater interest in the rôle plastics can play in aircraft construction. The Advisory Service is now under the charge of Mr. G. L. Hammond, who has worked so closely with Dr. Megson since the Service was formed.

Megson goes to R.A.E.

* * *

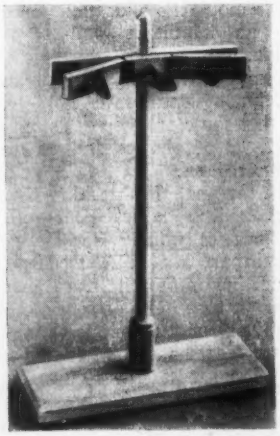
Scotland Yard has discovered plastics—for flooring to withstand the pounding of policemen's boots. Experimental strips of a variety of materials were laid down 12 months ago in the back hall of the Yard, whose entrance passages are stated to have the heaviest traffic of any London building. As a result, one material called "thermoplastic" (according to the report) has been selected as being completely superior to all others and has survived all tests. Moreover, it is warm to the feet and colourful. The new flooring will also be used at Limehouse police station—in Limehouse blues?

Calling all Boots!

* * *

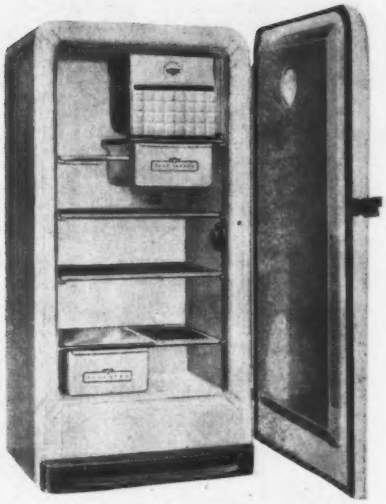
Nobody can accuse the plastics industry of being reactionary so far as receptivity of new ideas is concerned. But to-day, when orders are overflowing and raw materials down to little more than a trickle, suggestions are met either with a wry smile or hard words, according to the temper of the recipient of the bright news. However, since you can't keep a bad man down I must tell of a job or two that should have been done years ago—a couple of gadgets that every chemical laboratory in the world, in schools, technical colleges, universities, hospitals and factories, must have. I refer to the burette stand and clamp (pictured here) and the filter-stand, both very similar in structure and both very simple. They are now almost impossible to obtain, because hardwood is exceptionally scarce—I've been trying to get a couple for nearly a year. Iron burette stands and clamps are available at about 60s., a price which nearly made me swoon. The old wooden ones were about 6s. to 10s. a year or two ago. I suggest they be made of plastics: the clamp in several moulded parts (thumbscrew and jaws), the upright of 18-in. length extruded rod, and the base (12 ins. by 6 ins. by ½ in.) moulded or laminated. Neither burette nor filter stand undergo stresses, and chemists are generally fellows who are careful with their apparatus. And, before I forget it, another little plastic job wanted in every laboratory is a vertical draining board fitted with pegs (polythene?).

Plastics in the Lab.



DOGSBODDY.

Injection-moulded Parts for Refrigerators



"Frigidaire" Model OMM-7.4 seven cu. ft. household refrigerator.

TWO 1950 models of "Frigidaire" domestic refrigerators are at present in large-scale production at the Colindale factory of the Frigidaire Division of General Motors, Ltd. The large number of different plastics components of these two models are injection-moulded in various materials by the Plastics Division of E. K. Cole, Ltd., Southend-on-Sea.

The two different models with 7 cubic ft. and 9 cubic ft. capacity respectively, have been so designed as to make use of as few different components as possible. This has been done by using identical mouldings for such things as pegs and grommets, and for larger structural components such as the door-opening frame and the door-panel retainer frame by adapting the mouldings for the larger model to fit the smaller model by simple machining operations.

There are three main groups of mouldings for these refrigerators. Four long strips moulded in white polystyrene form the door-opening frame. The main function of this frame, which consists of the four mouldings seen on the outside of Fig 2, is to mark the gap between the outside shell of the refrigerator and the inner lining. The curved outside surface of these mouldings is interrupted only on the hinge side by a hole into which fits the door-operated switch for the internal light. The inside surface of the mouldings is interrupted by several projections which, when fitted into metallic slots, lock the frame in position. Fig. 3 shows these door-opening mouldings being fitted on the assembly line. To enable the strips moulded for the 9-cubic-ft. refrigerator to be used for the frame of the smaller model, it is only necessary to cut the mouldings down with a circular saw. To do this accurately, E. K. Cole, Ltd., have fixed up a special jig—illustrated in Fig. 6—which enables two strips to be cut at the same time.

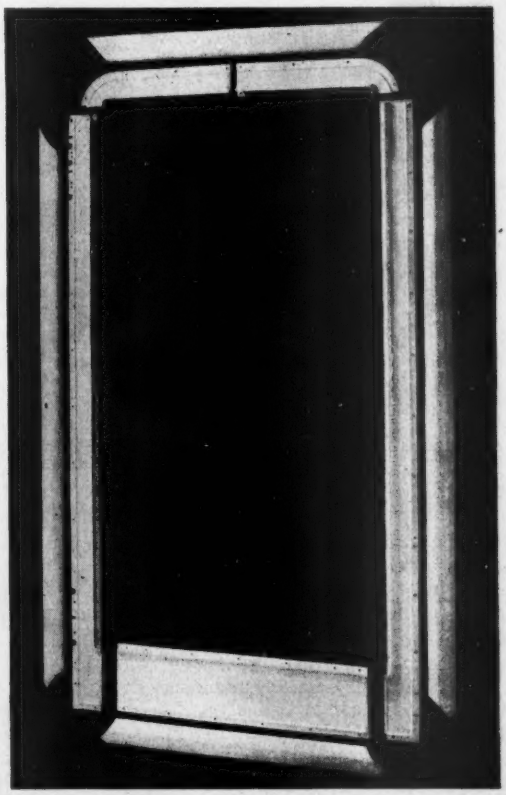


Fig. 2.—Components of door-opening frame (outside) and of breaker strip frame (inside) cut to fit the seven cu. ft. model.

As this frame is purely decorative and is not required to stand up to impact or bending, white high-gloss straight polystyrene was found to be the most suitable material. The next group of mouldings, however, actually form part of the structure of the door and, consequently, must stand up to considerable vibration. These are the components forming a thermal breaker strip between the outside door panel, which is exposed to atmospheric temperature, and the inside door panel, which remains at the colder temperature. The material chosen is a styrene co-polymer of very high flexural strength. Besides the structural advantages of using such a high-strength material, it enables the frame to be assembled by sliding one member into fitted grooves on another, making it unnecessary to mask the joints between two parts of the frame.

These frame mouldings presented most difficulties in tool design and in actual moulding conditions. Although the weight of the mouldings are well within the capacity of a 16-oz. machine, a 32-oz. Lester machine was used, due to the great length required. It was found best to use a single gate, but the great length—48 ins.—along which the material has

Fig. 3.—Door-opening mouldings being snapped into position.

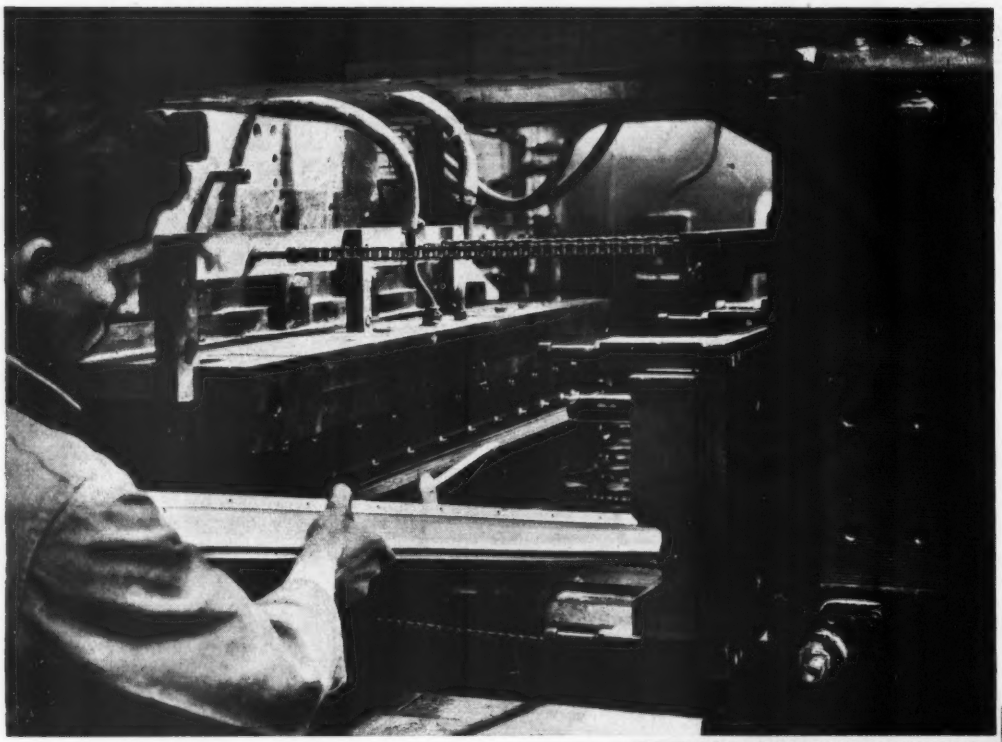


Fig. 4 (Left).—One of the 48-in. door panel retainer strips being removed from the injection-moulding machine.

Fig. 5 (Below)—Tool for the top door panel retainer.

to flow in very thin sections made it necessary to have a controlled temperature gradient along the die. This involved provisions for cooling the tool close to the gate to prevent local plasticity and for thermostatically controlled heating towards the extremities in order to prevent premature solidification.

Correct location of fixing holes and slots presented considerable tool-design problems as tolerances on centres spaced 3 ft. 10 ins. apart were only .015 in., representing an accuracy of .03 per cent. As the contraction of injection mouldings is affected by the injection temperature and pressure, it was obviously impracticable to calculate a contraction allowance that would satisfy the high degree of accuracy specified. The method adopted to overcome this difficulty was to partially make the moulds, omitting the various plugs and core pins, and to include the form in one die half only.

Fig. 6.—Jig and circular saw for cutting full-sized door-opening mouldings to the shorter dimension.

The ends of the form were blocked off and the overall length was arranged with an exaggerated contraction allowance, thus providing a relatively simple means of reducing the length following the establishment of optimum moulding conditions.

By this method, for example, it was established that the latch and hinge side retainer mouldings in co-polymer of styrene required a contraction allowance of .0039 per inch to satisfy the general tolerance of .015 in.

Experiments were made with pin-point gating on one of the straight styrene mouldings, but it was found that the temperature rise occasioned by the gate restriction resulted in embrittlement.

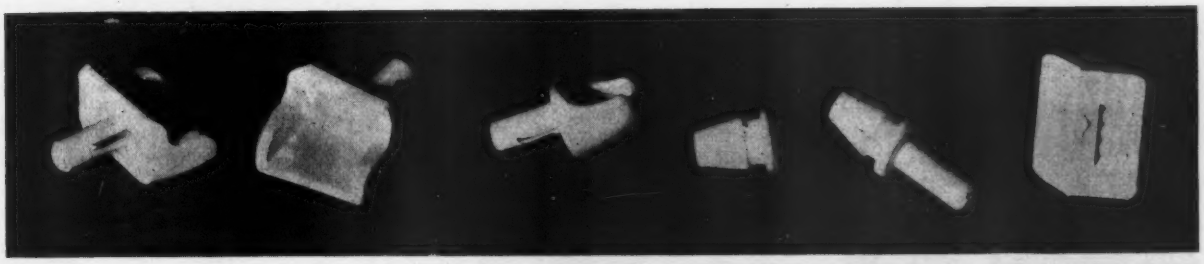


Fig. 7 (From left to right) Right-hand peg, left-hand peg and front peg moulded in styrene co-polymer; grommet, rear peg and door stop moulded in p.v.c.

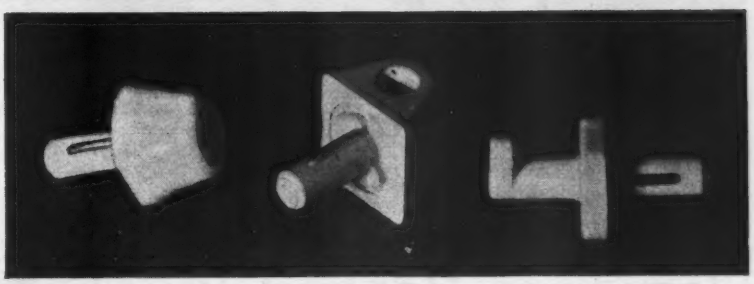


Fig. 8 (Right) Extra components for model OMM-9.2 are: "Alkathene" hydrator support cup and styrene co-polymer ring and hook pegs.

Fig. 9 (Below) Door panel retainer frame components being assembled.

In this set of components, as in the door-opening frame, the strips are moulded for the large refrigerator and the ends are cut off to fit the 7-cubic-ft. model. This cannot, however, be done on the top of the breaker frame because both ends are curved and, consequently, it is cut in two and the excess length taken out of the centre portion. The breaker-frame strips have a curved recessed flange on the inside to fit round the inner door panel and a small flange on the outer edge of the strips serves as a locating line for the rubber strip which actually seals the door.

The inside of the refrigerator employs a large number of plastic pegs and grommets, forming the supports for the shelves, trays, etc. Eighteen pegs consisting of five different mouldings are used on the 7-cubic-ft. model, whilst 34 pegs of eight different types are fitted in the 9-cubic-ft. model. The three types of pegs fitted to the front of the inner liner are seen on the left-hand side of Fig. 7. They are moulded in styrene co-polymer and they employ a novel locking device. The peg contains a strip of mild steel acting as a support for a U-shaped piece of spring steel. When the peg is inserted into the locating hole on the liner and twisted through 180 degrees with a special tool, this U-shaped spring provides a perfectly firm lock. Fig 10 shows an operator fitting these pegs, trays of which are seen in the background. For the rear grommet and rear peg, the flexibility of the p.v.c. in which these components are moulded is sufficient to lock them in position as soon as the plug is inserted.

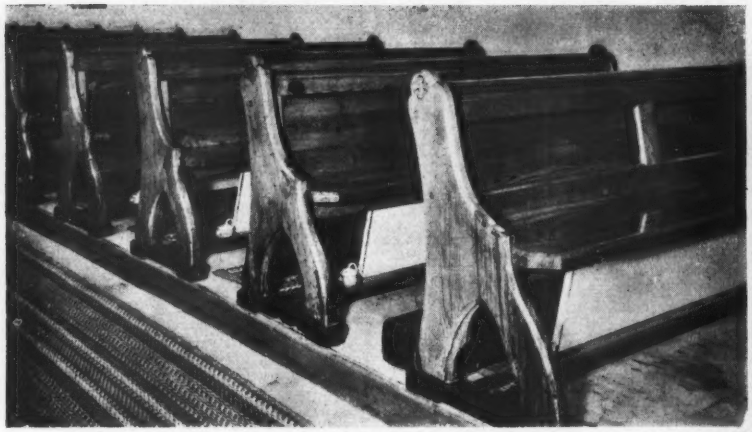
An interesting point concerning the rear peg is the completely covered mild-steel insert. This is produced by moulding half the peg and leaving part of the insert free so that it may be held for correct positioning. The peg is then finished by moulding a cover round the other half of the insert.

Another material, polythene, is employed for the hydrator support cup (Fig. 8, left), which is only used on the large model. The other two components, which are used only on the 9-cubic-ft. refrigerator, are the ring hook and the peg hook moulded in styrene co-polymer.

Finally, there is a drip tray moulded in straight polystyrene. This component replaces a glass slab which covered the meat-storage drawer on earlier models. Two further components moulded in polystyrene are really part of the electrical fittings of the refrigerator. These are a spacer in clear polystyrene which prevents direct contact of the thermostat with the freeze-box; and the temperature control knob, moulded in black polystyrene with letters and numbers filled in with white. One plastic component is used on the outside of the refrigerator. This is a p.v.c. door stop illustrated on the right-hand side of Fig. 7. It is fitted on a projection of the bottom door-hinge and acts as a buffer when the door of the refrigerator is swung back too far.

Acknowledgments are given to E. K. Cole, Ltd., Plastics Division, and to the Frigidaire Division of General Motors, Ltd., for permission to publish this information.

Fig. 10. Shelf-supporting pegs being locked in position on the inner liner of the refrigerator.



(Right and above) "Unity-Holoplast" electrical heating at Heanor Church, Derbyshire, seen as freestanding panel and beneath the pews.

Laminated Structural Plastics as Heating Panels

BY combining the unique features of the "Holoplast" cavitied structure and thermostatically controlled electrical heating, Unity Heating, Ltd., of Chilworth Manor, Southampton, have developed a new system which may be applied for heating walls, ceilings, skirtings and partitions and as freestanding panels. Such a form of heating promises to prove useful for a wide range of installations from small domestic requirements to complete schemes for schools, hospitals, offices, hotels and public buildings; indeed, as two of the photographs here reproduced show, it has already been adopted at Heanor Church, in Derbyshire.

As many of our readers are already aware, the "Holoplast" structural laminate made by Holoplast, Ltd., of New Hythe, near Maidstone, Kent, consists of a series of "girders" with webs at approximately 2-in. centres, separated by rectangular cavities running the entire length of the panel, thus forming a homogeneous structural unit, 1-in. thick, which has exceptional rigidity and strength. It is in each of the rectangular cavities of these panels that the special "Unity" heating elements are inserted, these elements being in the form of resistance wire mounted on mica strip and located with circular discs placed diagonally in the cavities, as seen from one of our illustrations showing the cross-section of a skirting panel.

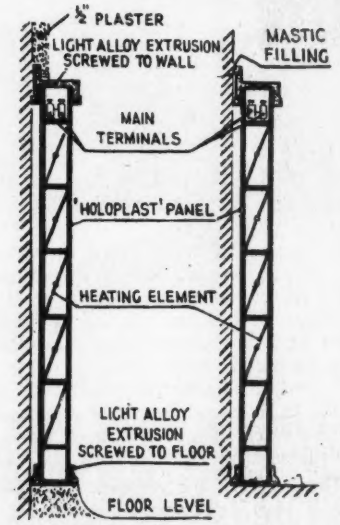
"Holoplast" itself has several qualities which make it especially suitable for constructing electrical heating panels. Apart from its high strength/weight ratio, it is unaffected by water, unattacked by vermin and all forms of fungi growth, does not support combustion nor spread flame, and is rigid and free from warping.

The heat energy emitted by the "Unity-Holoplast" panels is claimed to give comfortable warmth with a surface temperature of about 120 degrees F. The construction of the panel is such that it safeguards against scorch or burn through contact with the heating unit. Thermal capacity is low and speed of heating-up is rapid. The equivalent loading for standard voltages, e.g., 200-250 volts, varies from 75 to 85 watts per square foot for wall and ceiling panels and partition heating, and from 60 to 75 watts per square foot in the case of skirting panels.

The absence of induced air currents, such as are experienced with conventional radiator heating, reduces the chances of infectious disease being carried throughout the building, which is important in school and hospital heating. As floor space is entirely unrestricted by the use of the panels (excepting the freestanding type), the system as a whole is ideal for modern architectural schemes.

Panels are secured to the wall or ceiling with light-alloy angles. The provision of aluminium-foil insulation at the wall face prevents heat losses at the back of the panel. The heating panel, moreover, can be fixed flush with the wall, or, alternatively, mounted on the surface. In the case of skirting panels, the light-alloy sections enclosing the top and bottom are fixed to the floor and to the wall respectively, the floor fixing being concealed. Freestanding panels are provided with stands of light alloy, bronze or timber.

The skirting panels give a useful heating effect, as they provide a large proportion of radiant heat at floor level.



Details of "Unity - Holoplast" electrical heating in the form of skirting panels.

A Commercial Standard for Melamine Tableware in the United States

THE Society of the Plastics Industry Inc., New York, have sent us information on the first commercial standard for melamine plastic tableware, issued by the Commodity Standards Division of the United States Department of Commerce, Washington, D.C., and which, identified as "Heavy-duty Alpha-cellulose-filled Melamine Tableware, Commercial Standard CS 173-50," became effective on December 15, 1950.

This new standard, whose preparation was instigated by the Society of the Plastics Industry two years ago, purports to represent the best thinking and current practice of the melamine tableware in the United States and, as such, promises to be of material assistance to purchasers of this type of tableware. The purpose of the standard, of course, is to foster maintenance of the quality of melamine plastic tableware and to provide a nationally recognized specification for the information alike of producers, distributors and users.

The standard covers chemical and physical properties and methods of test of heavy-duty tableware moulded of alpha-cellulose-filled melamine plastics, i.e., material composed of melamine-formaldehyde resin combined with alpha-cellulose as the filler. The methods of test which are specified can be conducted by purchasers, distributors or moulders without the use of costly equipment, and by personnel that need not be specially trained. The meeting of these tests is evidence of proper moulding, but requirements regarding thickness, finish, resistance to boiling water, and resistance to dry heat are also set forth in the standard.

An identifying hallmark (Fig. 1) has been included as a feature of the new standard, and the use of this hallmark indicates compliance with the standard. The hallmark may be moulded into tableware or otherwise used by the manufacturer, e.g., it may be printed on cartons, letterheads and trade literature, and included in advertising.

Fig. 1.

Should compliance with this commercial standard be indicated by a manufacturer of melamine tableware, and it developed that the product does not come up to this standard, the manufacturer is in violation of a Federal statute and is subject to prosecution by the Federal Trade Commission, which is identified with the United States Government.

Recommended Commercial Standard for Heavy-duty Alpha-cellulose-filled Melamine Tableware

(Proposed by the Society of the Plastics Industry and adjusted in accordance with comment from other organizations)

(1) **Purpose**

1.1. The purpose of this Commercial Standard is to foster maintenance of the quality of heavy-duty alpha-cellulose-filled melamine tableware, and to provide a nationally recognized specification for the information of producers, distributors and users.

(2) **Scope**

2.1. This Commercial Standard covers chemical and physical properties and methods of test of heavy-duty tableware moulded of alpha-cellulose-filled melamine materials. The materials used are composed of melamine formaldehyde resin combined with alpha-cellulose as the filler. An identifying hallmark and recommended statement of compliance are included.

(3) **Requirements**

3.1. THICKNESS.—Tableware conforming to this Commercial Standard shall have a thickness of not less than 0.100-inch over not less than 90 per cent. of the surface area, and the remainder shall be not less than 0.090-inch in thickness.

3.2. FINISH.—The surface of all tableware shall have a high lustre produced by moulding and not by the application of finish or protective coating or lacquer, or by the use of other adulterants. Flash or parting lines only shall be buffed to a high polish.

3.3. RESISTANCE TO BOILING SULPHURIC-ACID SOLUTION.—When tested in accordance with para. 4.2, tableware shall show no chalking and/or loss of gloss which is readily perceptible without close examination.

3.4. RESISTANCE TO BOILING WATER.—When tested in accordance with para. 4.3, the tableware shall not develop cracks, or show surface chalking or any other defects that might impair the serviceability or appearance of the tableware.

3.5. RESISTANCE TO DRY HEAT.—When tested in accordance with para. 4.4, the tableware shall show no cracks.

(4) **Methods of Test**

4.1. The methods of test are especially designed so that they can be conducted by purchasers, distributors or moulders, without the use of costly equipment, and by personnel that need not be specially trained. Meeting these tests is evidence of proper moulding.

4.1.1. Five specimens chosen at random shall be tested to determine conformance of tableware with each of the requirements of Section 3. If one of the five specimens fails to meet the requirements of a given test, five additional specimens shall be subjected to that test, all of which shall be required to pass the test in order to indicate conformance of the tableware with this Commercial Standard. If more than one of the original five specimens for a given test fails, the tableware shall be reported as failing to conform with this Commercial Standard.

4.2. SULPHURIC-ACID TEST.

4.2.1. MATERIALS.—

4.2.1.1. Aqueous solution of sulphuric acid 0.8 per cent. by weight. This solution can be obtained from a local druggist or chemical supply house.

4.2.1.2. Porcelain enamel or stainless-steel pail, with cover, about 2- to 3-qt. capacity (2,000 to 3,000 ml.). Enamelled ware must not be used if the inside surface is chipped, exposing bare metal.

4.2.1.3. Heater, preferably a gas burner about 4 to 5 ins. in diameter. In any event, it should have sufficient capacity to keep the acid solution boiling fairly vigorously.

4.2.2. PROCEDURE.—Five untested specimens shall be used for this test. From the moulding to be tested, cut a cross-section strip about 3 ins. wide, if a plate, dish or saucer is involved. If testing a cup, cut a section of about one-half of the moulded part, taking for the test that part which includes the handle. The entire piece of tableware may be used if it is desired not to destroy it by cutting.

Heat to boiling a fresh portion of acid solution, keeping the container covered. Immerse the test piece(s) and re-cover the vessel. Keep boiling. Remove test piece(s) after 10 minutes ±0.5 minutes, rinse in cold water and dry. Inspect for conformance with para. 3.3.

4.2.3. PRECAUTIONS.—

4.2.3.1. The acid solution is corrosive, and care should be taken that it is not splashed on person or clothing, or about the premises.

4.2.3.2. Use fresh acid solution for each test run.

4.2.3.3. The solution must be kept boiling during the 10 minutes of the test. If too many test pieces are put in at once, the solution will be cooled to such an extent that it will stop boiling, thus endangering the accuracy of the test. By trial and error, one can determine the maximum number of

parts which can be properly tested at one time.

4.2.3.4. Test pieces can be attached to fairly heavy cord or string, and be removed by this means when the test is completed.

4.2.3.5. Test pieces should be kept separated during boiling so that the acid bath has free access to all surfaces.

4.2.3.6. Dispose of waste acid solution by allowing to cool, then flushing it down the toilet, using plenty of water.

4.3. RESISTANCE TO BOILING WATER.—Five untested specimens shall be used for this test. Each sample of tableware shall be placed in boiling water for 30 minutes, removed, and allowed to stand for one hour at room temperature. This cycle shall be immediately repeated three times to give a total of four such cycles. The tableware shall be allowed to stand for 48 hours in air at room temperature. In cases of dispute, a temperature of 23 degrees ± 1.1. degrees C. (73.5 degrees ± 2 degrees F.) and a relative humidity of 50 per cent. ± 4 per cent. shall be maintained. Inspect the tableware for conformance with paragraph 3.4.

4.4 RESISTANCE TO DRY HEAT.—Five untested specimens shall be used for this test. Place the tableware in a circulating-air oven for 8 hours at 170 degrees F. Cool to room temperature, and inspect for conformance with paragraph 3.5.

(5) Marking and Identification.

5.1. HALLMARK.—Pieces of heavy-duty alpha-cellulose-filled melamine tableware may carry the hallmark shown in Fig. 1, which shall constitute the manufacturer's declaration of compliance with this Commercial Standard.

5.2. In order that purchasers may be assured that pieces of heavy-duty alpha-cellulose-filled melamine tableware purchased actually comply with all requirements of the Commercial Standard, it is recommended that manufacturers include the following statement in conjunction with their name and address on labels, invoices, sales literature, etc.:—

This (these) article(s) of heavy-duty alpha-cellulose-filled melamine tableware complies (comply) with Commercial Standard CS — , as developed by the trade, under the procedure of the Commodity Standards Division, and issued by the U.S. Department of Commerce.

5.3. When available space on labels is insufficient for the full statement in legible type, an abbreviated statement, as follows, is recommended:—

Complies with CS — , as developed by the trade, and issued by the U.S. Department of Commerce.

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Plastics Supplies

Sir,—I note with some interest this morning your Editorial on raw materials in reply to Mr. Norman Punfield's letter in the March issue of "Plastics."

My company have this matter very much at heart and we take whatever precautions we can to arrest any exploitation of our materials in these days of short supply. As it happens, we are sending out to-day a letter to all our polystyrene moulding powder customers on this subject, and for your information I enclose a copy of this circular letter.

ERINOID, LTD.,
John Harvey,
Managing Director.

Lightpill Mills,
Stroud, Glos.

[COPY.]

ERINOID POLYSTYRENE.

Dear Sir,

Our inability to satisfy in full the demands of our customers is a matter which causes us some concern. We have at all times done our utmost to distribute our limited supplies as fairly as possible to our customers in the moulding industry.

We are, therefore, most perturbed to hear that Erinoid polystyrene moulding powders are being offered for resale at premium prices. In the interests of the moulding industry in general, we shall curtail supplies to any customer taking advantage of the general material shortage in this way.

We hope you will appreciate our reasons for adopting this policy, which is intended for the benefit of all concerned, and we look forward to receiving your support in our efforts to maintain equitable distribution of available supplies at standard prices.

Yours faithfully,
for Erinoid, Ltd.,
M. GARDNER,
Sales Manager.

Plastics Supplies

Sir,—With reference to our letter on the subject of material scarcity and controls which appeared in the March issue of "Plastics," we would point out that this company specializes in injection moulding only, and, therefore, any remarks which were made applied only to injection moulding materials. Your courtesy in publishing this clarification will be greatly appreciated.

PUNFIELD AND BARSTOW (MOULDINGS), LTD.

Westmoreland Road,
Queensbury, N.W.9.

Interlaminate Murals

Sir,—I note in the March issue of "Plastics" ("Plastics in the Service of Man," No. 17, Catering Equipment) that reference is made to walls which incorporate an interlaminate mural painting. I should be very much obliged to you if you could put me in touch with the people who supply or carry out the mural work.

FOLLAND AIRCRAFT, LTD.,
H. P. Folland,
Managing Director.

Hamble,
Southampton.

[EDITOR'S NOTE.—The incorporation of interlaminate mural paintings or drawings are carried out by Warerite, Ltd., Ware, Herts, and by Thomas De La Rue and Co., Ltd., 84-86, Regent Street, London, W.1, and possibly by other firms.]

Double-tier Soap Tray

Sir,—For months past I have been trying to locate an ordinary plastic double-tier soap tray as used in practically every kitchen. My inquiries at many large stores have had negative results; all they have to offer are the painted tin variety, which invariably lose their paint and go rusty in a very short time. Surely there must be some firm in England manufacturing this very essential household item, and I shall be glad to learn of their name and address.

MONICA COPLEY (MRS.).
"Merryways,"
Sheep Walk,
Shepperton-on-Thames, Middx.

Moulded Lamp Shades

Sir,—In our capacity as export merchants we are endeavouring to locate a firm producing a standard line of plain moulded conical lamp shades for export to Burma. It would appear that there are a very large number of firms, some of whom may be producing just what we require.

PENNINGTON STEVENS AND TAYLOR, LTD.

Ling House,
Dominion Street, E.C.2.

Badges

Sir,—We wish to inquire the cost of making small plastic badges about the size of a shilling, either showing the Refugee Relief Ship or in the form of a ship. Names and addresses of firms able to undertake this class of work in small quantities will be welcomed.

REFUGEE SERVICE SOCIETY.

14, Hunsdon Road,
Rose Hill, Oxford.

Plastic with Metallic Sheen

Sir,—We are anxious to identify and obtain supplies of plastic sheeting similar to the enclosed sample.

HANWELL OPTICAL CO., LTD.

Birds Hill,
Letchworth, Herts.

[EDITOR'S NOTE: The sample which our correspondent sends appears to be cellulose acetate, thickness 10 thou., in which aluminium powder has been incorporated to give the metallic sheen.]

Packaging Machinery

We continue our review of the second National Packaging Exhibition, held at Olympia in February, with a description of machinery for plastics packaging.

AN impressive sign of the importance attached to packaging in this country was the large number of different machines at Olympia designed to manufacture, convert and seal a variety of packages and packaging materials. The greatest interest to users of plastic materials was the large variety of machines for heat-sealing thermoplastic films and sheets.

A. H. Bland (Engineers), Ltd., West End, Yeading Lane, Northolt, Middlesex, have developed a wide range of these sealing machines, mostly designed for use with "Alkathene" polythene film. They range from simple hand - operated crimping and sealing machines to large continuous band-sealers, into which packs, such as loose drum liners, can be fed at a high rate.

A recent addition to the range is the type 5T.F.A.H. portable hand-operated quick-sealing machine for polythene and p.v.c. An interesting feature of this machine, which produces a seal 5 ins. long and $\frac{1}{16}$ in. wide, is that it may be taken to the pack where the object to be packed is too bulky to be brought to a normal machine. This has been used successfully to seal the large "Alkathene" film envelope used in the export packaging of Austin cars. The weld gives a perfect seal which is at least as mechanically strong as the original film.

Fig. 1.—A variety of "Pyramid" heat-sealing machines for thermoplastic films (A. H. Bland (Engineers), Ltd.).

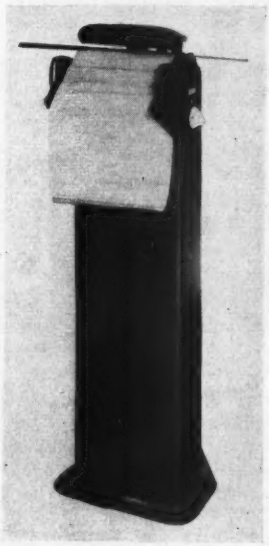


Fig. 2.—Foot-operated bag-sealing machine made by D. C. Engineering Co., Ltd., for Porosan, Ltd.

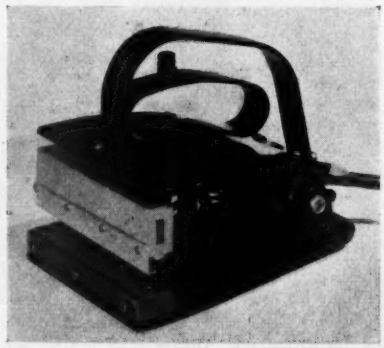


Fig. 3.—Model 5T.F.A.H. portable hand-operated sealing machine. (A. H. Bland (Engineers), Ltd.).

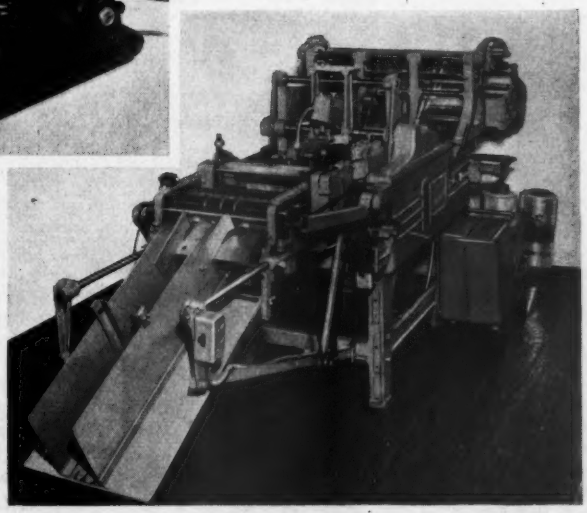


Fig. 4.—"Simplex" polythene bag-making machine. (Soag Machinery Co.)

Another heat-sealing machine for polythene is that made by **D. C. Engineering Co., Ltd.,** for **Porosan, Ltd.,** Warwick Court, High Holborn, London, W.C.1. There are several interesting refinements which overcome some of the difficulties encountered in removing the sealed pack quickly and smoothly from the heating jaws. By using a continuous band of fabric on which and to which the bag closure is sealed, it is possible to handle the bags at high speed, the band being drawn an inch or so at each sealing, thus holding the sealed bag clear of the next to be offered to the sealing jaws. As the jaws are fitted with a "Fluon" (polytetrafluoroethylene) strip on their upper pad, the "hold" of the seal to the other polythene surface is complete and the bag draws away smoothly from the jaws. There is, in addition, the "tack" of the softened polythene which adheres it lightly to the fabric backing interposed; by the time the loop of fabric has reached its lowest point the polythene-to-polythene adhesion is perfectly set and the bag ready to be peeled off and packed into outer containers.

Another machine made by the same firm was shown on the stand of **Cascelloid, Ltd.,** Abbey Lane, Leicester. This is worked by a switch in an automatic time cycle, the jaws being closed by magnetic power. Time, pressure and temperature of the sealing operation can be automatically controlled. A cloth roll for moving the bag after sealing is adopted here as in the previously described machine.

A small machine for sealing polythene bags is the "Hypak" heat-sealer manufactured by the **Rival Packing Division** of the **Oppenheimer Casing Co. (U.K.),**

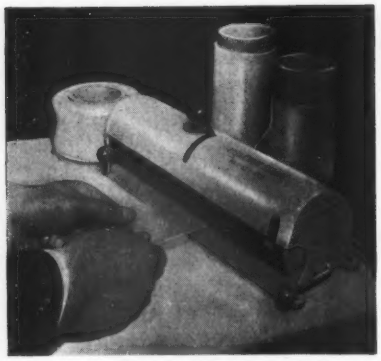


Fig. 5. The "Hypak" heat-sealer.

Ltd. This was shown on the stand of **I.C.I., Plastics Division.** The machine is extremely simple in design, construction and operation and is consequently marketed at a very low price.

More specialized and complex machines for making and sealing packages were also seen at Olympia.

Fig. 6. Automatic polythene bag sealer. (D.C. Engineering Co., Ltd.)

"Sealtite" pharmaceutical packages manufactured by **Ivers-Lee (Great Britain), Ltd.,** were described in our review of the packaging services last month. The machine which produces completely sealed bags of weighed quantities of powder, however, deserves a few more words of description.

The Ivers-Lee vertical B.I. powder-packaging machine is fed with a roll of heat-sealable packaging material (Fig. 7, right). In the first stage of the process the crimping jaws close on the film—which has been folded double—to form three sides of a bag. An automatically weighed amount of powder is fed into this bag, which then moves down and is sealed by the next operation which, at the same time, forms the base and sides of the following bag. Finally, the sealed bag is cut and falls on a conveyor belt. Thus at one operation the machine is forming and filling one bag, sealing another and cutting off a third.

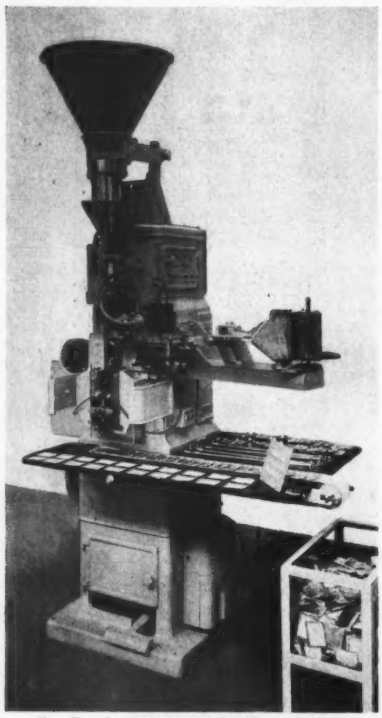


Fig. 7. Ivers-Lee vertical B.1 powder packaging machine.

Various improvements in machinery utilizing plastics packaging material were in evidence. For example, the wrapping of irregular-shaped articles in a form that will maintain sales appeal has now been solved by a technique developed by **Goodyear Tyre and Rubber Co., Ltd.** This "Snug-Wrap" machine, manufactured by **Grayson's Engineering Co.,** Sedgley Street, Wolverhampton, and marketed under licence by **Charles E. Douglas and Co., Ltd.,** 76-86, Strand, London, W.C.2, applies a tight individual wrapping of "Pliofilm" to all kinds of irregular-shaped commodities. The film is passed over electrically heated rollers and then between two foamed-latex rolls which cushion the plastic tightly round the article to be wrapped. A conveyor belt finally carries the package forward. Speed of operation corresponds with the speed at which the commodity is fed into the foamed-latex rollers.

Fig. 8. The "Snug-Wrap" machine.

The right-angled creasing of thermoplastic sheet for box-making is now greatly speeded up by use of the "Taber" thermocreaser, a production of Taber Instrument Corporation, represented in this country by **Soag Machinery Co.,** Juxon Street, Lambeth, S.E.11. In this machine an accurately heated thermostatically controlled creasing blade presses the material into a metal forming die or a resilient rubber pad. Due to this unique feature, the lighter gauges of thermoplastic material are creased instantly. The machine operates on cellulose acetate, ethyl cellulose, vinyl acetate or cellulose nitrate sheeting of 5 to 20 thou. thickness, up to 30 ins. wide. It is used with the "Redifon" box welder described in "Plastics" June, 1950, page 173.

Fig. 9. "Taber" thermocreaser.

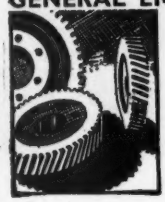
A fully automatic machine (Soag Machinery Co.) for the high-speed production of flat or gusset bags from polythene film operates at speeds up to 4,800 per hour, and uses either extruded tubing or flat material in roll form. The operator has only to thread the roll stock into the machine and take out the finished bags as they become stacked in the receiving receptacle. The change-over from one size of bag to another is effected in a few minutes. An electric eye is incorporated for producing bags to perfect printed register from reels of previously printed film.

A rotary patch-lining machine by **Lerner Machine Co., Ltd.,** Lea Valley Road, Ponders End, Middlesex, is fully automatic in applying a cellulose acetate film to cover an aperture in a carton blank

(*Continued on page* 101)

World's Industry Employs Plastics

GENERAL ENGINEERING



Laminated wood for jigs and tools.—The properties and application of Hydulignum (Hordern-Richmond, Ltd., Haddenham, Bucks), are described. This material has found useful applications for jigs and press tools for aluminium, using rubber moulding technique. ("Machinery (London)," 1950/Dec. 21/671.)

Transparent guards for power presses. A suggestion to attach upright sheets of Perspex ¼-in. thick to the sides of press tools. These can surround the press tool and should only have gaps for the material to pass. ("Mech. World," 1951/Feb. 9/137.)

Moulded threads.—K. Brandenburger deals with the problem of providing moulded components with a thread, and compares bad and good designs. ("Oesterreichischer Maschinenmarkt und Elektrowirtschaft," 1950/Nov./471.)

Moulded pulleys for a drill press have reduced the manufacturing costs by two-thirds. By means of an ingenious tool with four cutting edges, four V-belt grooves can be machined simultaneously. ("Machine and Tool Blue Book," 1951/Feb./206.)

Laminated, plastic tubing is surveyed by D. E. Roland. At least 10 grades of the thermosetting laminates are available, providing a wide range of products for mechanical, electrical and corrosion-resisting applications. A table gives mechanical and electrical properties of nine different grades of laminated plastic tubing. ("Materials and Methods," 1950/Dec./64.)

Rotary Tablet Press.—A double press made by Arthur Colton Co., Div. of Snyder Tool and Eng. Co., 3400, E. Lafayette Avenue, Detroit, 7, has a capacity of 1,575 tablets/min. for a maximum diameter of ½ in. and depth of ¾ in. Twenty-seven punches and dies, and two stamping stations exert maximum pressure of 5,000 lb. Another machine has a maximum output of 1,930 tablets/min. for a maximum tablet diameter of ¾ in. This machine has 33 punches and dies. ("Materials and Methods," 1950/Dec./92.)

Rubber-phenolic materials are produced for obtaining greater impact strength. W. Goss describes this new development in detail, comparing with woodflour, fabric, cotton flock and asbestos materials. A number of interesting applications are described. ("Product Engineering," 1951/Jan./137.)

Welding thermoplastics.—An up-to-date survey by K. Krekeler differentiates between autogenous heating, friction heating, hot air, heated tools, high-frequency heating and flame polishing. ("Schriftenreihe des Verkehrsministeriums des Landes Niederrhein-Westfalen." 1949/Booklet No. 5, p. 29.)

Creep-time properties of "Lucite" and "Plexiglas" have been investigated by J. Marin, Yoh-Han Pao, and G. Cuff for the following stresses: Tension, compression, bending and torsion. In a log-log diagram a linear relation exists between the minimum constant-creep rates and stresses. The creep deflection and creep rate in bending could be predicted, using creep constants in tension and compression. (A.S.M.E. Paper 50-A 19, presented Annual Meeting, No. 26-Dec. 1.)

Steels for plastic moulds.—Valuable data on the selection of die steels are given by L. F. Spencer. Factors to be considered are: Size, design, available moulding pressures, material to be moulded. ("Tool Engineer," 1950/Nov./20.)

ELECTRICAL

Stresses in telephone receivers are made visible by moulding them of transparent plastics. Compressive forces are applied simulating those which occur when a receiver is dropped on end. The optical fringes permit determination of the stresses and their distribution. ("Bell Laboratories Record," 1950/Dec./536.)

Plastics at high temperatures.—The creep properties of plastics used as electric insulators, such as polyethylene, ebonite, polystyrene, and polymethyl methacrylate, were investigated by W. Letharsich at temperatures near the softening point. Strangely enough, the creep properties resemble those at room temperatures, but the stress applied is considerably lower. (Technical Report L/T 242, Brit. Electrical and Allied Industries Research Assn., 1950.)

Phenolic laminate for high-frequency insulation, produced by The Richardson Co., Melrose Park, Ill., U.S.A., are said to give a desirable balance between electrical and physical properties. ("Materials and Methods," 1950/Dec./87.)

Measuring dielectric strength at elevated temperatures.—An apparatus has been developed by W. Hand and R. R. Winans permitting test temperatures up to 250 degrees C. Specimens tested include fabric-base and paper-base phenolic resins, as well as glass-base melamine and silicon resins. ("A.S.T.M. Bulletin," 1951/Jan./63.)

A pawl for telephone dial was formerly made of a moulded hard-rubber body and a steel bearing pin. Recently the complete part was made of nylon, eliminating the insert. ("Machine Design," 1951/Jan./143.)

Wire insulating material.—Plasticized polyvinyl chloride and polyvinyl chloride-acetate resins have found widespread use as insulating and jacketing materials. A wide range of properties can be obtained by proper formulation and the various uses are described in detail by J. E. Flood. ("Wire and Wire Products," Vol. 25, 1950/Dec./1041.)

MISCELLANEOUS

New plastic-impregnated gloves (American Rubberising Co., 617, 11th Avenue, S., Minneapolis, Minnesota) are said to have excellent wear-resistant qualities as well as high corrosion resistance. ("Products Finishing," 1950/Dec./110.)

Brushes for duct cleaning are made by Kleen-e-ze Brush Co., Ltd., Hanham, Bristol, with nylon bristles and a body of wood-based laminated plastic. ("Machinery Lloyd," 1951/Jan. 13/89.)

Flexible, corrosion-resistant plastic.—B. G. Staples describes the application of "Teflon" rings and tapes as gasket and gasket-protecting materials in chemical processing equipment, in particular that for dairy, food and beverage processing. ("Materials and Methods," 1950/Dec./48.)

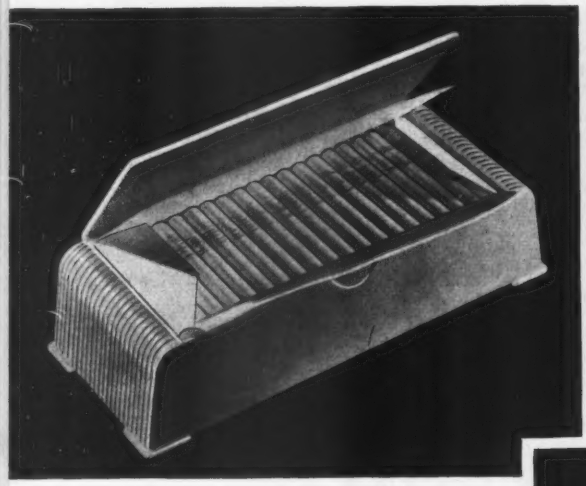
Effect of fuel immersion on laminated plastics has been studied by W. A. Crouse and collaborators. Nineteen samples of laminated plastics were exposed to the effects of cyclic and continuous immersion in heptane, toluene and SR-6, a test fuel. The influence on weight, dimensions and flexural properties was studied. (A.S.M.E. Fall Meeting paper 49-S-32, abstract. "Mechanical Engineering," 1950/June/506.)

New silicone elastomers have been developed by Dow-Corning Corp., marketed as Silastic 250; their properties and applications are described. ("Materials and Methods," 1951/Jan./67.)

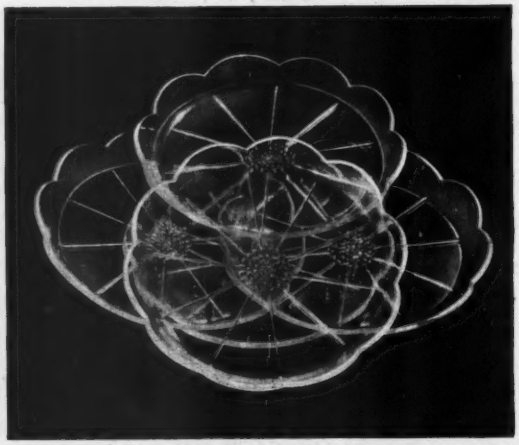
PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

18. Fancy Goods



(Above) Gift casket for cigarettes, moulded in ivory "Beetle" urea material by the Streetly Manufacturing Co. Ltd., for Benson and Hedges (Overseas) Ltd.



(Above) Artificial flowers shaped from cellulose acetate sheet and coloured by hand spraying are manufactured by Miller-Kent Permanent Flowers, of Hartlip, Kent.

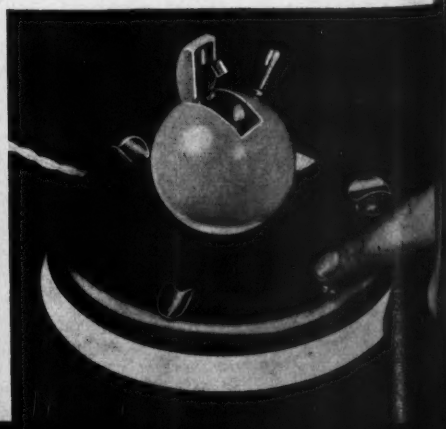
(Left) Injection-moulded "Paragon" cocktail mats in clear polystyrene are marketed by Lawleys, Ltd.

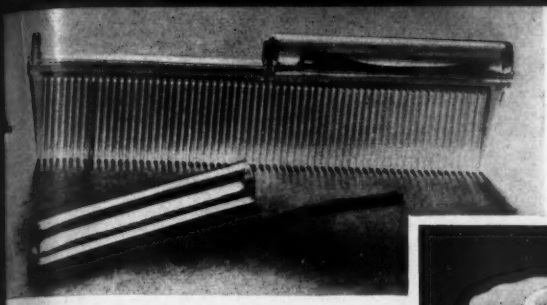
(Right) Children's napkin rings with hand-painted and moulded decorations, made in cellulose acetate by P.A. Permuta Plastics, Ltd.

(Below) The main use of "Crinothene" translucent polythene sheeting is in the manufacture of lighting fittings and lampshades, such as these manufactured by Godfrey Lampshades, Ltd. (Photo: I.C.I.)

(Above) Intricate decorative designs in many colours may be produced by "back-engraving" clear "Perspex" and colouring the resulting cavities. Engraving marks may be hidden, as in this paper-weight, by backing with opaque "Perspex."

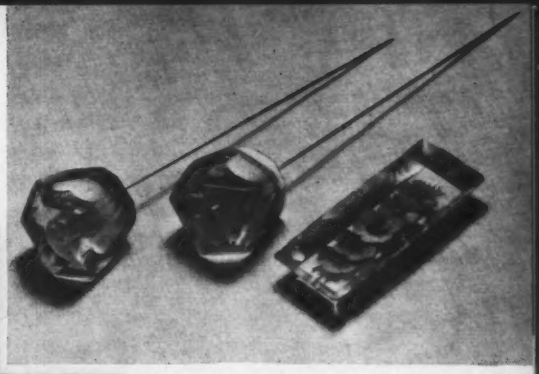
(Below) This combined electric table lighter and ash-tray made by Faulkalite Electrical Products, Ltd., incorporates a sphere and ash-tray base moulded in "Beetle" melamine by Mellowes and Co. Ltd.

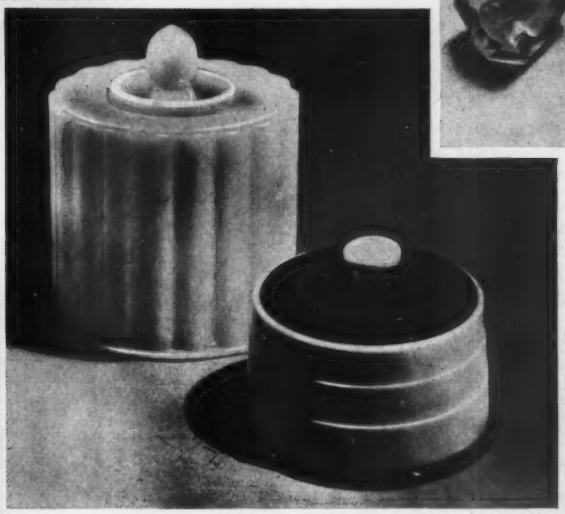




(Above) This novel comb, manufactured by E. R. Holloway, Ltd., incorporates a sliding container in which hair-grips may be kept.

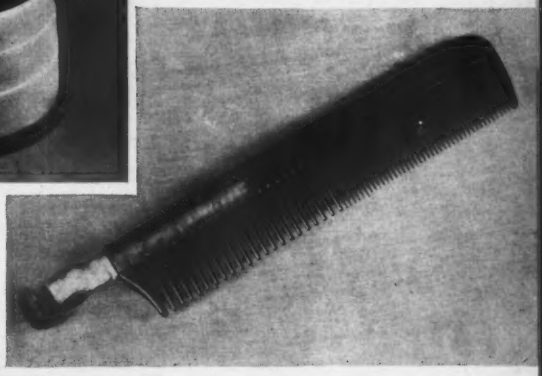
(Right) Hat pins and brooch showing further examples of the type of floral decorations obtained by reverse engraving "Perspex."

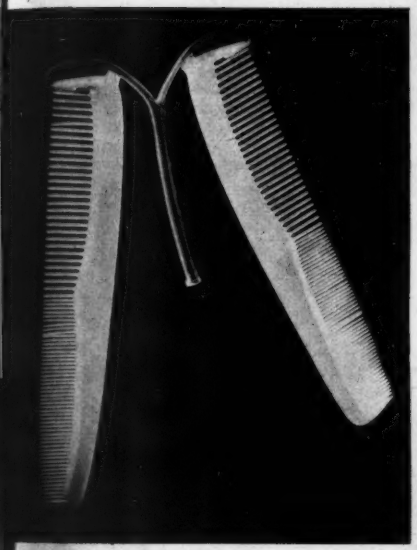




(Above) Powder bowls made in "Catalin" cast phenolic resin manufactured by Catalin, Ltd.

(Below) The "Nu-Lustre" comb, moulded in cellulose acetate by Aberdeen Combworks Co., Ltd., contains a pad soaked in perfume or hair lotion which seeps through the small holes between the teeth of the comb.





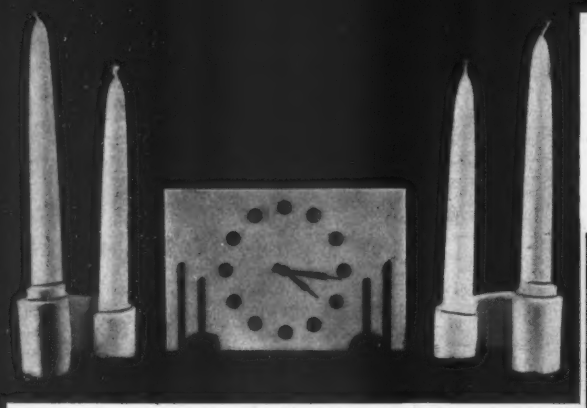
(Above) The toughness of injection-moulded nylon makes it virtually impossible to damage combs made in this material. (Photo: I.C.I., Ltd.)

(Below) The cup of the golf ball wiper manufactured by Hellermann Electric, Ltd., is made of soft flexible polyvinyl chloride.

(Right) This small basket in pastel-coloured cellulose acetate is moulded by British Moulded Plastics, Ltd.

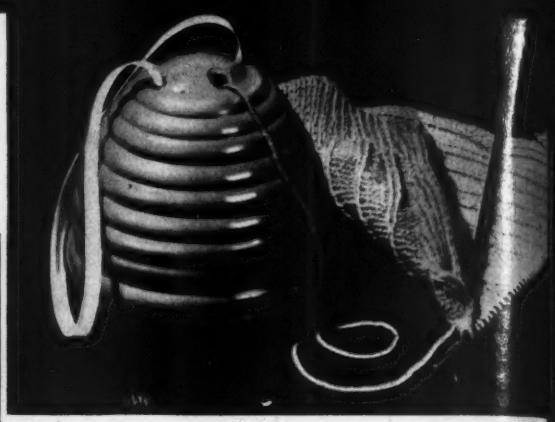
(Left) High-frequency welding is used in the manufacture of wallets from embossed p.v.c. sheeting made by Erinoid, Ltd. ("Plastics," 1947/Feb./72.)

(Right) Metal-plating on plastics raises possibilities of great decorative effect. This experimental plating of a polythene bottle has been carried out by Metaplast (England), Ltd.



(Above) Three plastic materials—"Perspex," "Catalin" and p.v.c. extrusions—are used in the construction of the clock and candle-holders made by O'Keeffe, Bros.

(Below) Small ornaments for brooches can be injection-moulded on the small hand-operated machine made by Asmidar, Ltd. ("Plastics," 1949/Oct./85.)



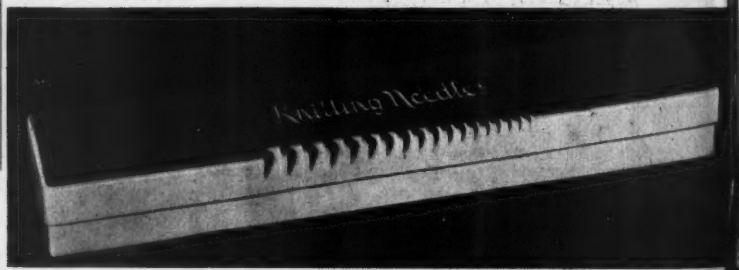
(Above) Wool dispenser moulded from "Scarab" material by N.B. Mouldings, Ltd. The "Beehive" design, approved by Patons and Baldwins, Ltd., makers of "Behive" wool. (Photo: B.I.P., Ltd.)

(Below) Vase and two trays in pastel-coloured phenolic casting resins are manufactured by Maurice Blair and Co., Ltd.

(Above) Different patterned lamp-shades are easily made up by pleating a flat circular sheet of cellulose acetate by means of a moulded plastic clamp. Both clamps and shades are made by Lustro Distributors, Ltd.

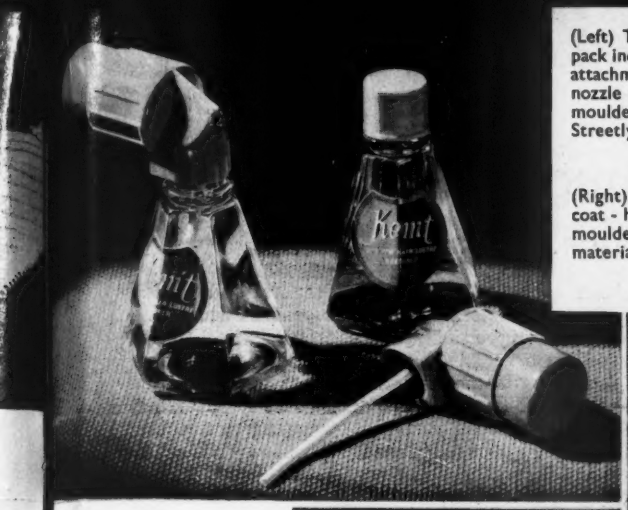
(Above) These plastic dress ornaments, coated with a metallic film, are manufactured by Combex, Ltd.

(Below) This knitting-needle box, moulded in white urea by Halex, Ltd., has recently been redesigned for longer needles and now incorporates a needle gauge on the front edge.



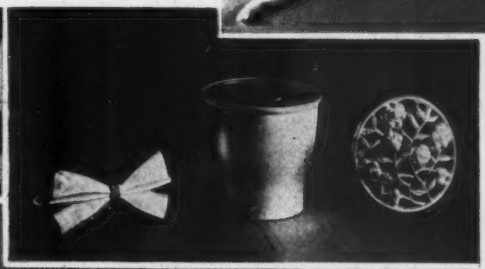
(Left) This selection of products by Scintillex, Ltd., includes a small sewing set, p.v.c. manicure set, powder compacts and various plastic ornaments.

(Right) This plastic novelty ash-tray is manufactured by The Vogue Manufacturing, Co., Ltd.



(Left) The "Kemt" hair lotion pack incorporates a spray pump attachment with components—nozzle assembly and plunger—moulded in "Beetle" by the Streetly Manufacturing Co., Ltd.

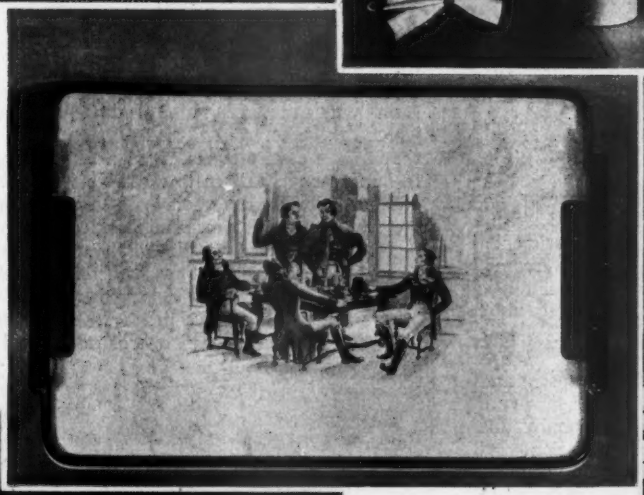
(Right) Decorated children's coat-hangers are injection-moulded in cellulose acetate material by Universal Metal Products, Ltd.

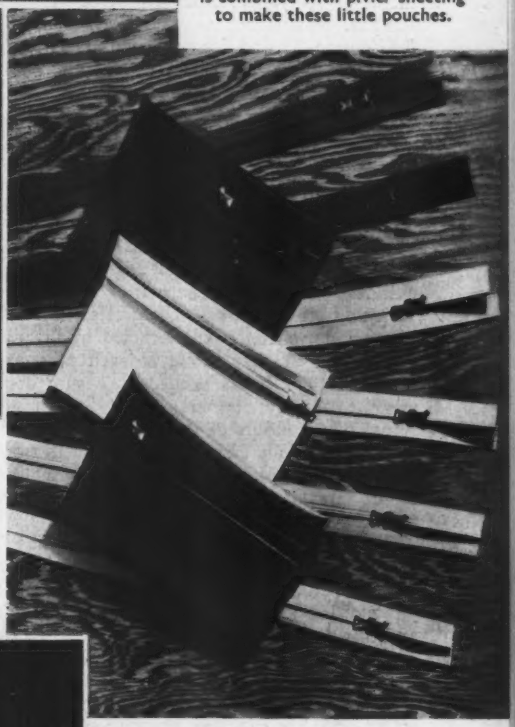


(Left) Plastic egg-cup and dress ornaments are electro-plated by B. Berger and Co., Ltd., to give a metallic appearance ("Plastics," 1948/368).

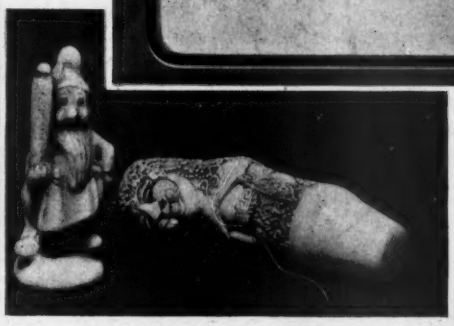
(Below) The novel slide fastener made by Philips and Associates, Ltd., entirely of extruded p.v.c., is combined with p.v.c. sheeting to make these little pouches.

(Below) The "Zambesi" buttons with decorative mottle are manufactured by Hornflowa, Ltd.





(Above) A print incorporated in a sheet of "Warerite" laminate is used as the base of this tray, manufactured by the D. E. Plastic Developments Co., of Cheltenham.



(Above) Statuette and decorative umbrella handle are made of phenolic casting resin by Lacrinoid Products, Ltd.

(Below) "Marco" cold-setting polyester resins (Scott, Bader and Co., Ltd.) combined with suitable fillers are used to manufacture the statuette and the boxes shown here.

(Left) This "Perspex" tray with elaborate design engraved from the underside was manufactured by Pasco Industries, of Slinford, Sussex.

(Below) Powder compacts, fabricated from transparent "Perspex" by J. Starkie Gardner, Ltd.

Plastics in Building—VII

By JOSEPH B. SINGER, B.Sc.(Arch.), A.R.I.B.A.

THE advent of plastics in the field of floor coverings can be best seen against a background of existing materials, particularly in relation to the properties of these materials as compared with synthetic resin products. Wearing quality, appearance, comfort and ease of cleaning are the main factors which determine the choice of a floor finish. The relative importance of these factors depends on whether the flooring is intended for domestic or industrial purposes.

Floor-covering materials, generally, can be divided into the following groups: (1) Tile and slab flooring, including composition slabs, asphaltic tiles, cork and rubber tiles; (2) sheet flooring, e.g., linoleum, cork and rubber; (3) jointless flooring, including anhydrite, asphalt, cement and bitumen, granolithic, terazzo, magnesium oxychloride, rubber latex cement, and fleximers; (4) wood flooring, including wood blocks.

Flooring Tiles

Pioneering work in plastics flooring was done for the "Vinylite House" erected at the Chicago Fair, 1933, where a vinyl type of floor covering was used. In the experimental stage, shortcomings such as shrinkage had to be overcome; quality had also to be greatly improved before tiles could be mass-produced. Various plastic materials, including vinyl chloride and the copolymer of vinyl chloride and vinylidene chloride were used in the manufacture of such tiles. Fillers, resisting the action of chemicals, had to be chosen and dimensional changes counteracted by arranging the tiles with laminations at right angle to each other. Additionally, the tiles had their backs sanded to ensure better adhesion, and in some cases were laminated to a sheet of inorganic substance. Vinyl plastic floors of to-day, however, can be compared in quality on a fully competitive basis with traditional coverings.

In general, polyvinyl chloride floor materials are produced in the form of tiles and continuous rolls. The tiles are manufactured in a standard size of 9 ins. by 9 ins. by $\frac{1}{8}$ in. by Thomas De La Rue and Co., Ltd., Plastics Division, and to a standard size of 12 ins. by 12 ins. by $\frac{1}{8}$ in. (or $\frac{1}{4}$ in.) by G.R.L. Plastics, Ltd. Both types are available in a range of plain and mottled colours. The plastics ingredient imparts resiliency, and this property enables the surface to recover from pressure markings and dents; very heavy point loads, however, should be distributed. The tiles are unaffected by oils, and are resistant to most acids and cooking fats. The floor finish is warm and has a water absorption of only 0.054 per cent. The material has low inflammability and does not support combustion, but the proximity of heat sources and sub-floor heating may cause the edges of the tiles to curl and some caution should therefore be exercised as to where these tiles are laid.

The laying of plastics floor covering should be done preferably by specialists. Special adhesives are used for fixing the tiles to the sub-floor, which may be concrete (on which the tiles can be laid direct) and wooden floors (where a layer of felt is recommended to eliminate any uneveness of the boards). Chemically resistant tiles are manufactured from a high molecular weight vinylite resin and special types of fillers and plasticizers. A heavy filler content is characteristic of these tiles, which are produced in a number of colours and are also laid by means of special adhesives.

Other types of flooring tiles are made from asbestos fibre, mineral fillers and pigments, with a thermoplastic binder. The mixed ingredients are bonded by being passed through pressure-heated rollers, the resulting sheet being cut into tiles of the desired standard size. These tiles are produced in a thickness of $\frac{1}{8}$ in. for use where only light traffic is encountered, and $\frac{3}{16}$ in. for situations where they have to withstand heavier wear. Such tiles, manufactured under the trade name "Semastic" by Semtex, Ltd., have undergone hardness tests by measuring the impressions produced by a 1-in.-diameter ball falling from a height of 6 ft. These tests have shown that the hardness of the tiles compares favourably with linoleum, sheet rubber, cork tile and wood block, but is inferior to quarry tiles and magnesite composition flooring. Other tiles with a synthetic resinous binder include the "Accotile" tile (Armstrong Cork Co., Ltd.), and the "Marley" tile (Marley Tile Co., Ltd.).

Resin-bonded sawdust and wood chips are also used in the manufacture of floor tiles, using a formaldehyde type of resin for bonding the wood under heat and pressure. The proportion of sawdust to resin is generally 10 to 1. This resin-bonded material is also produced in standard-size boards, which can be cured and dried prior to being machine-cut into the form of square or rectangular shapes, the latter being laid in herring-bone pattern to resemble wood blocks. This type of floor covering has good insulating property, it is warm to the feet and its fire resistance and dimensional stability are better than that of wood. "Weyroc" flooring blocks and tiles (Airscrew Co. and Jicwood, Ltd.), manufactured in three sizes, 9 ins. by 9 ins., 6 ins. by 6 ins., and 9 ins. by 3 ins., all $\frac{5}{8}$-in. thick, have a weight of 55 lb. per cubic ft., and are laid with adhesive on concrete or other rigid sub-floors.

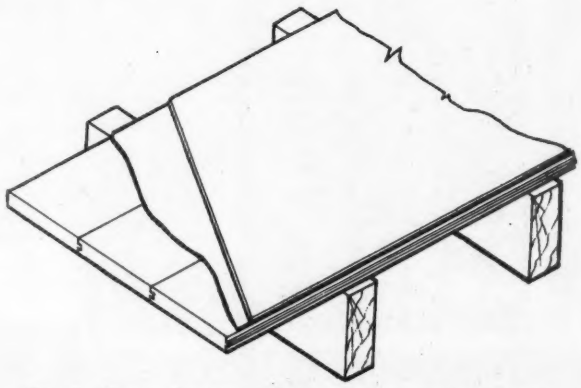


Fig. 1.—Plastics flooring in sheet form on wood floor with underlay of felt.

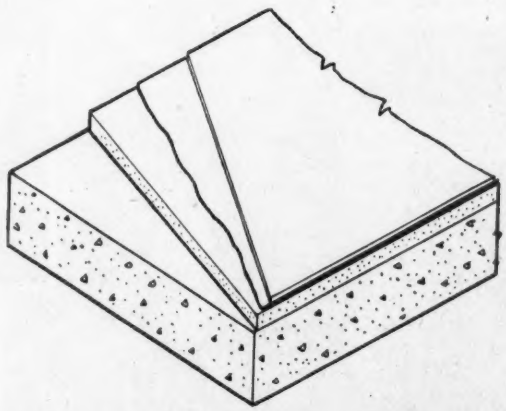


Fig. 2.—Plastics flooring in sheet form on cement-screeded concrete sub-floor with underlay of felt.

Sheet floor covering based on polyvinyl chloride, with asbestos or other inorganic fillers and pigments, is calendered to uniform thicknesses and widths in continuous lengths, for example, 12-yard rolls, 36 ins. wide and 3/22-in. thick. As supplied by G.R.L. Plastics, Ltd., under the trade name of "Phenco," the range of colours includes cream, green, red, brown and black, and marbled effects.

This flooring has been tested for wear, indentation, pliability, water absorption and inflammability in accordance with a British Standard. It has also been subjected to the action of acids and organic solvents and results have been satisfactory, apart from contact with such liquids as concentrated sulphuric acid, trichlorethylene and petroleum-type solvents. Resistance to indentation is similar to that of a good quality linoleum but, subjected to bending, the material is superior to linoleum of the same thickness. Both linoleum and "Phenco" flooring are more susceptible to indentation when exposed to heat, e.g., in front of fires, in this respect the plastics flooring is affected more appreciably. Such limitations to use must be taken into account when laying the material.

Plastics Flooring in Sheets

Prior to laying, the sheets must be unrolled and turned to eliminate the curvature of the roll. The material is then cut to fit the floor, allowing ¼-in. to 1-in. overlap at the seams for dimensional changes. After 14 to 21 days the seams should be cut to a butt finish, and fixed with linoleum brads if necessary. When fixed with a special adhesive to the sub-floor, the rolls should be cut in prior to applying the adhesive. Both the sub-floor and the material are coated with a thin layer of adhesive, and the sheets are then pressed in position, any air bubbles under the flooring being rolled out or treaded out. The use of an underlay of felt adds to the resilience of the floor.

Sheet flooring is also produced from a mixture of cork dust, sawdust or wood flour, and pigments, with a base of gelatinized nitrocellulose. These materials are mixed into a paste, which is spread and compressed on a woven jute backing. It is manufactured in thicknesses up to ¼-in., 6 ft. 6 ins. wide, in rolls up to 32 yards long. An adhesive is used for fixing to the sub-floor and the sheets are butt jointed. The material is harder than linoleum and fairly quiet and warm, and is more resistant than linoleum to the action of soda in detergents used for washing the floor.

Jointless Flooring

Plastics are used as ingredients in jointless flooring in combination with a dehydrated mix of blended cement, pigment and aggregates. The polystyrene, phenolic and polyvinyl types are based on the aqueous dispersions of their respective resins. The fleximer floorings are laid in the cold plastic state in situ on level sub-floors to form a continuous floor, ¾ in. thick, with a smooth float-finish. Concrete floors have to be cement-screeded, and fleximer underlays and primers are used under certain conditions. Although such a flooring can receive light traffic 48 hours after laying, the toughening of the material takes another two to three weeks. Regular polishing improves the appearance of all fleximer floorings and prolongs their life. At present they are available only in red, light brown and dark brown. The composition of fleximers can be modified to make the flooring suitable for industrial use, as regards being chemically resistant and withstanding the heavy wear of factory and workshop conditions.

Among fleximer floorings the polyvinyl acetate type deserves special attention. For this fleximer, polyvinyl acetate emulsion is mixed with cement, pigment and aggregate, e.g., either Portland cement, Snowcrete, or Cement Fondu being used with granite chippings, sand, cork granules and vermicultite, and laid to a thickness of from 3/16 in. to ½ in. The resiliency of the resulting floor is claimed to be equal to that of wood. When coloured aggregate is used, decorative effects can be achieved by rubbing down the surface, which can be finished with wax polish. Incidentally, it may be mentioned that the "dust" nuisance on a concrete floor can be reduced by adding polyvinyl acetate to the mix.

The design of a floor suitable for situations accommodating chemical plant involved various experiments in the plastics field. Monolithic construction with a resin-bonded concrete, although adequate in many respects, was subject to attack by alkalis. A "floating" type of floor, based on the principle of laying a chemically-resistant membrane on the sub-floor and finishing with a hard-wearing layer, however, has now been evolved. In this system polythene ("Alkathene") foil, 0.010 in. thick, which is manufactured in reels 46 ins. wide and 100 yards long, is jointed into a continuous membrane by heat welding the edges. This foil can be laid on concrete floors previously cement-screeded to a smooth finish. The polythene is finally covered with acid-resistant cement and finished with special tiles or bricks. Alternatively, the first screed can be omitted and the polythene membrane laid direct on smooth concrete sub-floor. In both cases, however, any air pockets under the foil have to be eliminated.

Among other applications, polythene foil can be used for the lining of ducts, sumps and tanks. It is already being used by Imperial Chemical Industries, Ltd., for floors at chlorine, and nitric acid plants, and for lining ducts which carry away acid spillage.

(*To be continued.*)

PACKAGING MACHINERY

(*Continued from page* 94)

and so form a "window" through which the contents can be viewed—a type of packaging for which there is a rising demand. A stack of punched cardboard blanks is placed on the feed table, from which they are taken out singly and passed on to the gumming unit which applies the adhesive to the inside of the blanks by rubber pads, shaped to suit the opening. The gummed blank is then passed to the patch feed cylinder, which carries the film ready for attachment to the opening, sufficient time being allowed for the adhesive to penetrate the fibres of the cardboard and become slightly tacky. The patch feed cylinder holds the patch firmly by means of suction and ensures accurate register of patch with blank. The output of the machine is 4,000 blanks per hour.

Plastics are used in the actual construction of a new automatic stocking packer by **Strachan and Henshaw, Ltd.,** Whitehall, Bristol, 5. This machine is completely enclosed when in operation, but the mechanism is lighted from within and can be kept under observation through a cover made of "Perspex." Both the feed and delivery tables are made from laminated plastics; there are also moulded Bakelite handwheels and resin-bonded gears.

Opaque white "Perspex" is also used in the construction of the main discharge chute, delivery spout and return chute of the "Hy-tra-lec" Model "A" automatic weighing machine manufactured by Industrial Products (Speco), Ltd. This model will accurately weigh and fill up 30 packets of potato crisps per minute. The "Perspex" components are fabricated by Thermo-Plastics, Ltd.

The simplest of all the sealing instruments shown at the exhibition, yet one which has widespread application, is the "Lyteze" sealing-iron. The entire instrument weighs only 6 ozs and heating is by a 25-watt element.

It was first designed for sealing hand-wrapped packages, but an interesting use, demonstrated on the I.C.I. stand, was the sealing of "Alkathene" drum-liners in a "bunch" seal. In this method, instead of making a flat seal along the top of the bag, the top is bunched together tightly, bound and then simply sealed by pressing the heated sealing-iron down flat onto the "bunch."

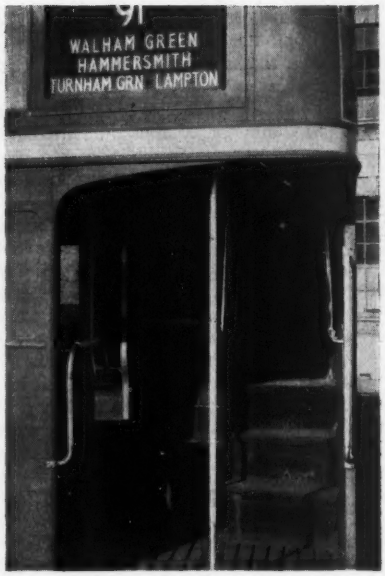
Continuous Non-slip P.V.C. Flooring

FOR some time past special moulded treads have been supplied to various transport undertakings, in particular the London Transport Executive, to provide a non-slip wear-resisting surface in those situations where accidents due to slipping most frequently occur, as at the front edges of steps.

The non-slip property of these treads is due to the incorporation of aluminium oxide grit, a material which is extremely hard and abrasive. The grit is bonded by means of a special p.v.c. compound which offers exceptional abrasion resistance and long life. As a final operation, after moulding the treads, the grit is raised on the surface by a special process. This surface provides the initial non-slip property; given such a start, it has been found that the relative wear of the grit and the plastic is such that a continuous non-slip surface is maintained as the tread wears away. It was after much experimenting that p.v.c. proved the most suitable material for bonding the aluminium oxide grit.

Special shapes have been produced to conform to the requirements of design for the various public transport vehicles. It soon became clear, however, that a flooring which could be laid over large areas in continuous lengths was also needed, and after lengthy development work a hessian-backed flooring with precisely the same properties has now been produced. This entirely new form is made in two thicknesses, 2½ mm. and 4 mm., and has already proved itself to be of considerable interest for many situations where satisfactory non-slip flooring has not hitherto been available.

The new continuous flooring is easy to lay, and will remain non-slip throughout its life; by the very nature of its composition it never can wear smooth. Further, it is resistant to practically all industrial chemicals and will stand up to the hardest wear, in all situations except those exposed to elevated temperatures.

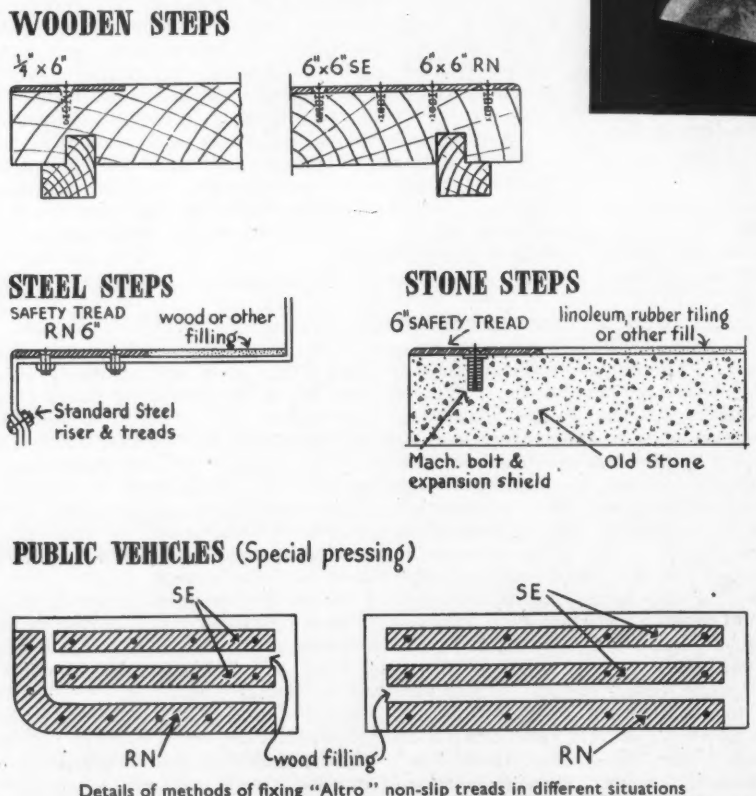


(Left) "Altro" non-slip treads are in use on London Transport buses.

For use in factories where liquid chemicals are likely to attack the underlying floor, a jointing paste is supplied to provide a complete sealing of the joints between the adjoining widths of the non-slip p.v.c. material. This jointing paste sets to form a cohesive seal which is impregnable to all those chemicals to which the flooring material itself is resistant.

In industrial situations the surface remains non-slip under both wet and dry conditions. From the point of view of non-slip quality alone, the main applications, however, are in corridors and staircases of public buildings, and areas of buildings over which there is considerable pedestrian traffic.

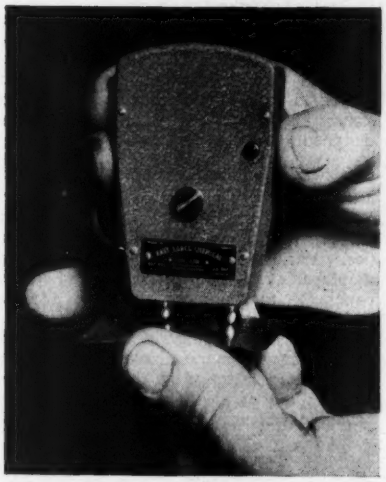
This new "Altro" flooring is produced by Welwyn Plastics, Ltd., Wellite Works, Woodside Road, Welwyn North, Herts, and the sole distributors are The Adamite Co., Ltd., Manfield House, Strand, London, W.C.2. It is obtainable in five colours—green, beige, brown, navy and red. At present the maximum width is 36 ins., but it is hoped that this will be increased shortly.



Details of methods of fixing "Altro" non-slip treads in different situations (RN, round nose. SE, straight edge.)

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes



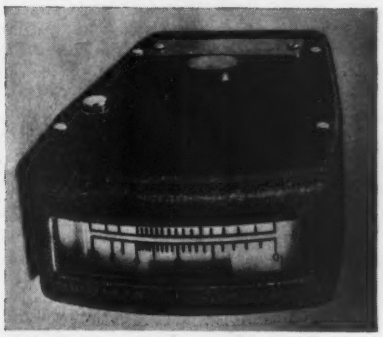
THICKNESS METER.—East Lancashire Chemical Co., Ltd., of Fairfield, Manchester, have allowed us to examine a new coating thickness meter which they have recently introduced. Known as the "Elcometer" (Brit. Pat. 624,572), it is a very convenient and compact, pocket-size instrument for measuring the thickness of all non-magnetic coatings—plastic films included—on an iron or steel base. Foils and sheeting, too, which are difficult to measure for point thickness over a large area, can also be quickly and accurately gauged if laid on a steel plate or table.

The instrument relies upon a strong pre-aged and durable permanent magnet for its operation; the magnetic flux across an air gap is varied as to the proximity of a ferrous surface to two contacts at the base of the instrument, the coating to be measured acting as a magnetic air-gap between the ferrous surface at the contacts. Independence of any external source of power means that the instrument is always ready for use. A special locking device allows measurements to be taken in almost inaccessible positions and the scale examined subsequently. Accuracy is of the order of ± 5 per cent. ± 0.0001 inch.

GAUGE AND TOOL MAKERS' ASSOCIATION.—In connection with the forthcoming Gauge and Tool Exhibition, May 15 to 25, the Association is holding a dinner-dance at the Savoy Hotel, London, on May 18, so that the exhibiting members, in particular, may have the opportunity of entertaining British and foreign visitors and their wives.

KEY INDUSTRY DUTY.—The Treasury have made an Order under Section 10(5) of the Finance Act, 1926, exempting tricresyl phosphate and triethyl phosphate from Key Industry Duty for the period beginning March 22, 1951, and ending August 19, 1951.

ACETONE.—The Treasury have made an Order under Section 10 (5) of the Finance Act, 1926, exempting acetone from Key Industry Duty for the period beginning March 2, 1951, and ending August 19, 1951. Additional Import Duties (No. 1) Order, 1951, also exempts acetone from additional duty



under the Import Duties Act, 1932, for a period ending August 19, 1951. The joint effect of these Orders is to make all types of acetone chargeable at the 10 per cent. general ad valorem duty only from March 2, 1951, to August 19, 1951.

MELAMINE.—Users of melamine in the United Kingdom will be interested to learn that the melamine plant of The British Oxygen Co., Ltd., which is being erected at Chester-le-Street, is likely to be in production in late 1951. In the meantime the Company is operating a small pilot plant, which enables them to provide bulk samples for industry to help forward the work of process development between now and the opening of the new factory.

MOULDING POWDER IMPORTS.—The British Plastics Federation reports the following details of private account imports of moulding powder for January, 1951:—

	Tons.
Licences issued:	
Cellulose acetate - butyrate (U.S.A.)	3.6
Polystyrene (Canada) ...	243.3
Polystyrene (Germany) ...	—
Arrivals:	
Cellulose acetate - butyrate (U.S.A.)	2.75
Polystyrene (Canada) ...	130.15
Polystyrene (Germany) ...	0.1

I.C.I. PLASTICS DIVISION.—Mr. J. C. Swallow has been appointed joint managing director of Plastics Division, I.C.I., Ltd. Since 1942 Mr. Swallow has been research director of the Division; previous to that he was research manager of the Alkali Division, where he was in charge of research work that led to the discovery and manufacture of polythene. He has been associated with I.C.I. since its formation.

Mr. E. G. Williams succeeds Mr. Swallow as research director of the Plastics Division. Mr. Williams joined the organization in 1934, and has been with Plastics Division since 1943; previously he was deputy manager of the Division's Research Department.

"LURON" COMPETITION, 1951.—A new "Luron" angling competition for anglers in every section of the British Isles, excluding Eire, organized by I.C.I. Plastics Division, manufacturers of "Luron" fishing lines and casts, opened on April 1 and will continue until December 31, 1951. The country is split up into seven zones, each of which includes famous rivers, canals and lakes stocked with fish, which can be entered for the competition. A first prize of £15 and a second prize of £10 will be awarded each month to those anglers who catch the best fish in each zone. In addition, £5 will be awarded to the retailer who supplies the "Luron" to the winning competitor. In the case of those zones primarily concerned with coarse fish the prizes will be given for the best fish irrespective of species. The judges will decide which, out of all the entries, are the two best fish, taking into account the weight, dimensions, site and details of catch. In addition to the seven zones for coarse and game fish, the coastal waters of the British Isles (Zone 8) are open to anglers during the holiday months of August and September, a selection of sea fish being specified. Further particulars and entry forms may be obtained on application to "Luron" Angling Competition, Imperial Chemical Industries, Ltd., Plastics Division, Welwyn Garden City, Herts.

CATALIN, LTD., announce that the net profit for 1950 was £14,197 (previously £5,489) after tax of £14,346 (£4,010). With the balance brought forward of £13,417 and taxation reserve not required of £1,704, there was available £29,318 (£23,417). The directors recommend payment of a 5 per cent. dividend (nil), and a transfer to revenue reserve of £10,000 (£10,000), leaving to be carried forward £13,804.

O. AND M. KLEEMANN, LTD.—It is announced, in connection with the issue to shareholders of 200,000 5½ per cent. cumulative redeemable preference shares of £1 at 21s. per share in O. and M. Kleemann, Ltd., that applications from shareholders were received for approximately 95 per cent. of the issue, the balance remaining being taken up by underwriters.

A. BOAKE, ROBERTS AND CO. LTD. exhibited a range of plasticisers and resins at the Oil and Colour Chemists' Association Technical Trade Exhibition, held at the Borough Polytechnic, London March 19-21.

NEW INSULATION CO., LTD.—As from April 1, 1951, the Company's name is changed to Permali, Ltd. This change is one of name only and involves no break of continuity or change of personnel from the existing organization.

HALEX, LTD., inform us that their export sales manager, Mr. A. H. Munroe, has visited 50 different countries on export business for the company, since September, 1946. The distance covered was over 250,000 miles.

VINATEX, LTD., will be exhibiting on Stand X20 in the Plastics Section of the B.I.F. at Earls Court, and not Stand X18 as announced in their advertisement. Stand X18 will be occupied wholly by Vinyl Products, Ltd.

DR. W. H. GARRETT, director of Monsanto Chemicals, Ltd., was presented with an inscribed silver salver by the Association of Chemical and Allied Employers, on the occasion of his retirement after three years as chairman of the Executive Board. Dr. Garrett, already a member of the Executive Board for 21 years, has now been elected Vice-president of the Association, and thereby becomes a permanent member of the Board.

ERRATUM.—We regret that our Editorial in the March issue (page 57) referred to the Controller of Plastics during the late war as "Sir Frank Merriam." This should, of course, have read "Sir Laurence Merriam."

New Productions

Combined Closure and Pourer

A new type of closure for a metal drum was seen at the recent National Packaging Exhibition. Known as the "FlexSpout," it comprises a metal stamping incorporating a flexible pouring spout moulded in polythene. As fitted to the drum, the cover plate of the concealed pourer projects less than $\frac{1}{2}$ in. above the surface of the end of the drum, thereby avoiding damage. When required, the polythene screw cap and centre seal are removed and the polythene pourer is pulled out with the finger or other suitable means. After use, the screw cap is replaced and the spout is then pushed back to the level of the stamping for safe housing.

The closure is leak-proof and when fixed to the drum provides perfect sealing, as the polythene of the spout itself acts as a gasket.

The inner seal, moulded in polythene, offers further assurance against leakage during transit. The spout can always be tightly enclosed with its own threaded cap after pouring, and here again no gasket is required.

The fitting is supplied as a complete unit and is fixed to the drum in one operation by aid of a simple tool after the drum has been filled, the drum itself (as supplied by the maker) having merely a flanged hole in place of the more costly neck. Polythene, of course, is unaffected by most chemicals and solvents at normal storage and transport temperatures.

The "FlexSpout" has been introduced by Visegrip Products, Ltd., 227, Grand Buildings, Trafalgar Square, London, W.C.2, who are associated with Reads, Ltd., manufacturers of metal drums, Orrell Lane, Walton, Liverpool, 9. It has been accepted by the U.S. Bureau of Explosives for I.C.C. Specification 17E, and tests have shown that drums so fitted can be dropped 6 ft. on to the closure without causing leakage.

Tariff Board

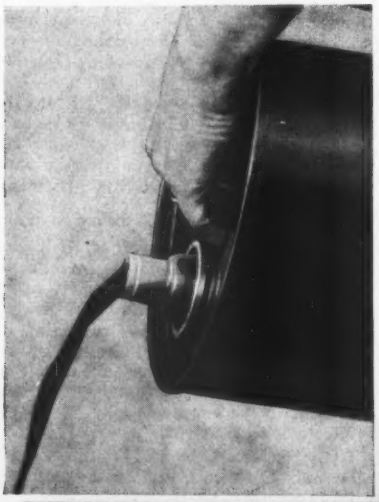
The new tariff boards which can be seen in many railway restaurants and snack bars were made for the Hotels Executive of British Railways by Lacrinoid Products, Ltd., Gidea Park, Essex. They were designed by Mr. Rodney Hooper, M.S.I.A., Lacrinoid's product designer. The material chosen for the job by the Hotels Executive was "Perspex." The colour approved was peach; the printing nigger brown. Delivery rate was 50 boards per week, each board consisting of 126 parts covering 84 variations. To avoid treating the boards as individual items, planning for batch production methods was adopted and the entire job was jigged up to eliminate guess work on machining and assembly. An important feature was that all slides had to be interchangeable, this applying to main slides as well as price slides, which are separate items. The slides are removed by depressing the spring-loaded side strips seen at each side of the board. In the assembly of the runners to the board, using chloroform as cementing medium, the steel jig was constructed correct to 1-thou. to each space so that the maximum error did not exceed 15-thou. It was thus possible to construct each board perfectly within the designed limits.

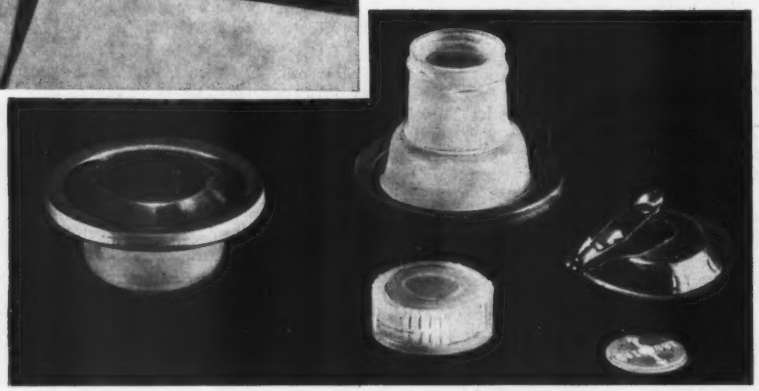
Cable-end Identification

To simplify identification in complicated electrical circuits, the use of some form of cable marker is now becoming standard practice. Various forms of marker have been employed, ranging from the hand-written paper tag to the more elaborate thimble-shaped, engraved plastic cable-end ferrule.

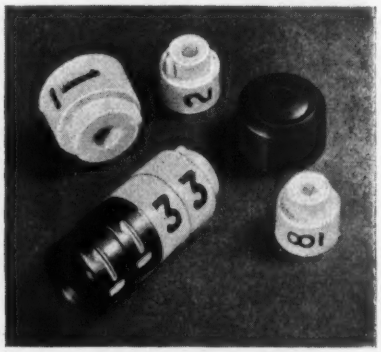
Due to its durability, neatness, and legibility, specially engraved plastic ferrule has always been regarded as the most satisfactory method of identification, the main disadvantage being that many firms find it

Tariff board.

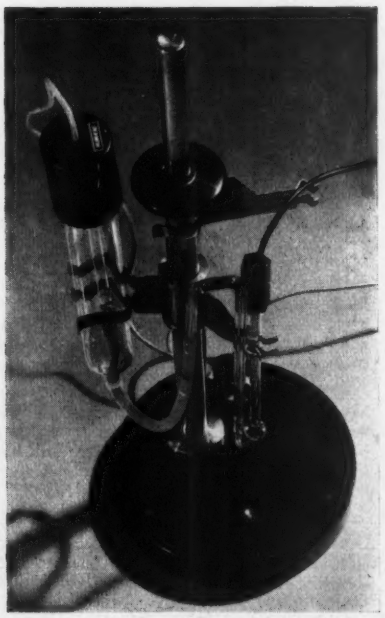




(Left and below) Combined drum closure and pourer.



Cable-end identification ferrules.



Mouldings for pH meter.

impracticable to carry large stocks of these ferrules. In order to eliminate this difficulty, Critchley Bros., Ltd., of Brimscombe, Glos, have now designed a fully interlocking plastic ferrule consisting of several units, each of which is engraved with a single digit or letter. From these an almost unlimited number of code numbers or combinations can be built; in fact, more than 1,000 different identifications can be made up from a stock of ferrules numbered from 0 to 9, using only a three-figure code.

To prevent movement, each ferrule unit is made with a key and keyway which ensures that they can only be assembled with the engravings in line and cannot at any time come out of alignment. The ferrules are normally black with white engraving or vice-versa, but other colours can be supplied to order. The entry of cables from both right and left, without one side reading "upside down," is provided for by ferrules being engraved for either hand as required.

Mouldings for pH Meter

There are four mouldings in the pH meter assembly which is produced by Muirhead and Co., Ltd., Croydon Road, Elmers End, Kent, namely, the caps for the calomel electrode and the glass electrode, the adjusting ring, and the base of the assembly. In each case the use of "Bakelite" moulding material X11078 has produced an exceptionally high surface finish and has ensured safe electrical insulation and resistance to corrosive influences.

Display Case

The display case for "Biro" pens here illustrated was originally intended to be made in wood, but this proved too costly. As an alternative, the case was moulded by J. F. Kenure, Ltd., Feltham, Middlesex, using cellulose acetate in silver and red grades produced by Courtaulds, Ltd. By using cellulose acetate the cost was lowered considerably. Moreover, the toughness and colour appeal of acetate were in favour of the adoption of this material. Technically, the moulding has an interesting feature in that the runners are retained as an integral part to act as strengthening members.

"Poly-tainer" travel set.

Travel Accessory

A new lightweight travel set, which has just appeared on the British market, is likely to be much appreciated by those who travel frequently. Complete with all the usual containers, it weighs only 7 oz., which is actually less than the weight of an ordinary jar of cold cream. It is, therefore, of particular appeal to travellers who are often troubled by restrictions regarding the maximum weight of personal luggage allowable for journeys by air.

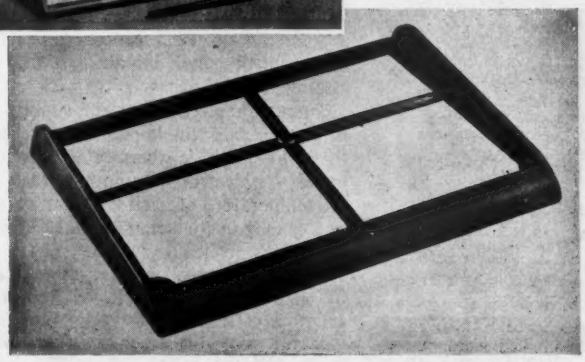
A further outstanding advantage of this "Poly-tainer" travel set is the fact that all parts of the outfit are absolutely unbreakable. The various containers which make up the set are manufactured from polythene. They withstand any amount of rough handling, and the entire outfit can easily be squeezed among other items of personal luggage without fear of clothes being spoilt by breakage or leakage of the containers during the journey. No other containers possess to such a notable degree the same combination of high strength and low weight.

The standard "Poly-tainer" travel set consists of four 4-oz. containers for liquid cosmetics, toilet preparations, perfume, etc., and two 2-oz. cream pots. These are contained in a neat zipper-fastening case. The natural milk-white finish of the container appears to be set off to perfection by their gold-lacquered caps which give a touch of richness to the set.

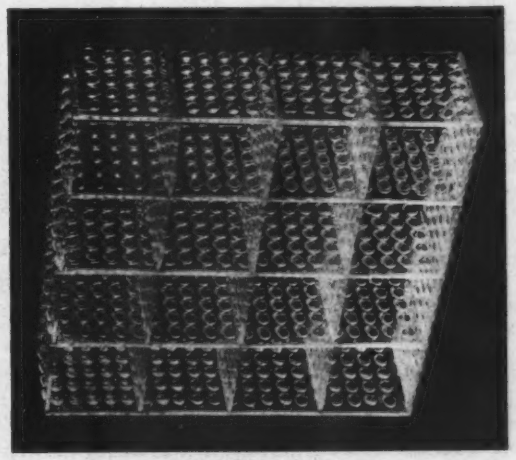
Industrial Appliances, Ltd., 21, Grosvenor Street, London, W.1, who are marketing this travel set, are already well known in the plastics field as suppliers of containers made from polythene.

Light Diffusion Fixture

A special "Perspex" pressing, 2 ft. by 2 ft., is cut up into strips and jointed and cemented for making the light diffusion fixture shown in one of our illustrations. It has been introduced by F. C. Johnson, 4, Malvern Close, Surbiton, Surrey. Units of any size in any convenient shape can be formed. In use, the fixture is placed in a metal bracket and suspended beneath the source of the light.



(Left and below) Display case, with runners as strengthening members.



Light diffusion fixture.

Machines for the Industry

The Auto-control "Bipel" Moulding Press

The prototype of this press, by B.I.P. Engineering Ltd., Aldridge Road, Streetly, Staffs, was designed initially for the Moulding Division of the B.I.P. Group. It is now available in three pressure ranges: 20-60 tons, 50-150 tons and 100-300 tons

FOR a number of years The Streetly Manufacturing Co., Ltd., had considered that the developments in the design of compression-moulding plant had not kept pace with injection-moulding machines. From experience gained by more than 20 years in the moulding industry, plans were therefore drawn up for a completely new press, incorporating all the requirements of compression and transfer moulding.

In 1946 a batch of prototype machines, complete with hydraulic drive, was installed and began to work on the normal 24-hour-per-day production conditions. Initially, many modifications were necessary, and further experimental work, particularly in the field of hydraulic and automatic control, had to be carried out. But so successful was this prototype press that after a three years' trial run it was decided to form a new company, B.I.P. Engineering, Ltd., to manufacture and market it, so that the experience gained should be available for the moulding industry generally.

The first two presses off the production line were demonstrated at the B.I.F. in May, 1950. The press is now made in three basic sizes, all of which are oil-hydraulic downstroking machines, and which together cover a pressure range from 20 to 300 tons. All models can be fitted with transfer and ejection equipment if desired. Type 100, illustrated here, has a pressure range of 50, 100 or 150 tons, and a transfer ram giving an upstroke of 27 tons.

The hydraulic-drive system is of particular interest to the moulding industry. The principle is to generate a medium pressure (1,000 p.s.i.), using a simple, inexpensive, balanced Vane pump, and to feed the presses through a ring main. By means of an intensifier, built into the press frame, the pressure applied to the ram can be stepped up to either 2,000 or 3,000 p.s.i. This unit, though small in size, is capable of operating up to 12 presses. It consists of a pump, a gas-loaded accumulator, a supply tank, and an unloading valve. Such a system has all the advantages of a pump built into the press, but it is far less expensive in initial outlay and more economical in power consumption.

When a single press is desired, a small edition of the drive unit can be built within the channel section of the press frame, making the whole machine self-contained.

It will be seen that the press is made from very heavy steel plate, keywayed to give far greater rigidity than normal tie-bar construction. Moreover, this design allows the electrical and hydraulic equipment to be installed neatly, yet easily accessible, in the cupboards formed by the channel section of the frame, and closed in with sheet-steel doors.

The "exploded" drawing shows that the main ram (3) is of the annulus type, eliminating separate drawback rams. This also applies to the transfer ram. Twin-set packing is used to provide the hydraulic seal, and as the rams are hard-chromed and highly polished, maintenance is negligible. The ram heads are fitted with cast-iron piston rings and the cylinder bores in which these operate are precision honed.

The moving table (21) is provided with accurate guides (23), set at an angle of 45 degrees, designed to maintain control even if the table expands slightly. To minimize the expansion caused by mould heat spreading through the frames, water-cooling platens are provided. The guides are readily adjustable for wear. This ensures perfect tool alignment at all times.

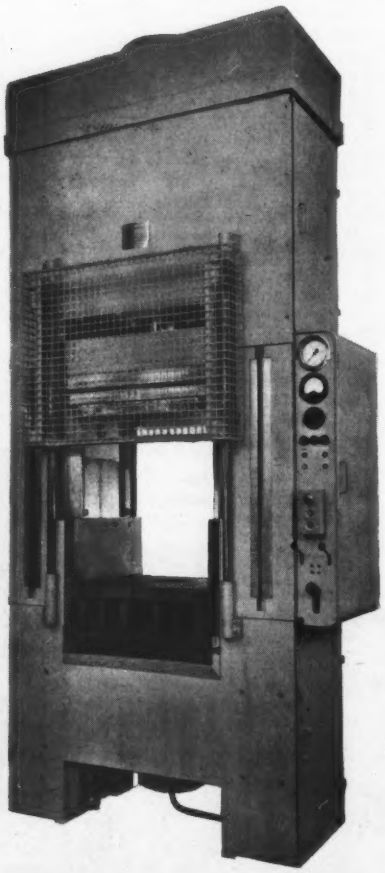


Fig. 1.—Type 100 Auto-control "Bipel" Press with transfer ram. (B.I.P. Engineering Ltd.)

The right-hand side of the channel section contains the intensifier (4). This is a continuously acting reciprocating intensifier, designed and patented by B.I.P. Engineering, Ltd., which can step up the line pressure to a ratio of either 2 : 1 or 3 : 1. Thus, this machine can be used as a 50-ton press from the line pressure, and a 100-ton or 150-ton press using the intensifier. Two valves, provided with spanner flats, which can be unscrewed or screwed up in a few seconds, select the required ratio.

Non-return valves (11) protect the circuit and prevent intensified pressure from being incorrectly applied.

The slow-close valve (9) is operated by a cam, actuated by the press dropping. In a mould having a large number of small-diameter pins, the valve can be set to provide a final close as slow as 1 in. per minute, allowing the material to flow slowly around the pins and thus avoid excessive breakage.

The guard is operated pneumatically from the shop line. Two air pistons (28) contained in the guide tubes (5) supply the lifting force, and this can be applied either by a manual lever (20) or automatically from the sequence controller. The guard is interlocked, not only with the scotches (26), but also with the main control valve (12), giving absolute protection to the operator. This mechanical double interlock is shown very clearly in the detail sketch (Fig. 3).

The electrical equipment, housed in the left-hand side of the channel section, consists of a control panel (33), a Short and Mason sequence controller (34), and a standard electrical process timer (35). The control panel contains all the fuse and switchgear necessary to split up the incoming three-phase power supply into three separate single-phase heat zones. Each of these is thermostatically controlled by electronic equipment (36), and the temperature of each zone can be seen at a glance in the accurate dial meter (8) fitted with a selector switch.

The auto controller is extremely simple to set and adjust, and it will reproduce accurately and consistently any conceivable moulding technique, including

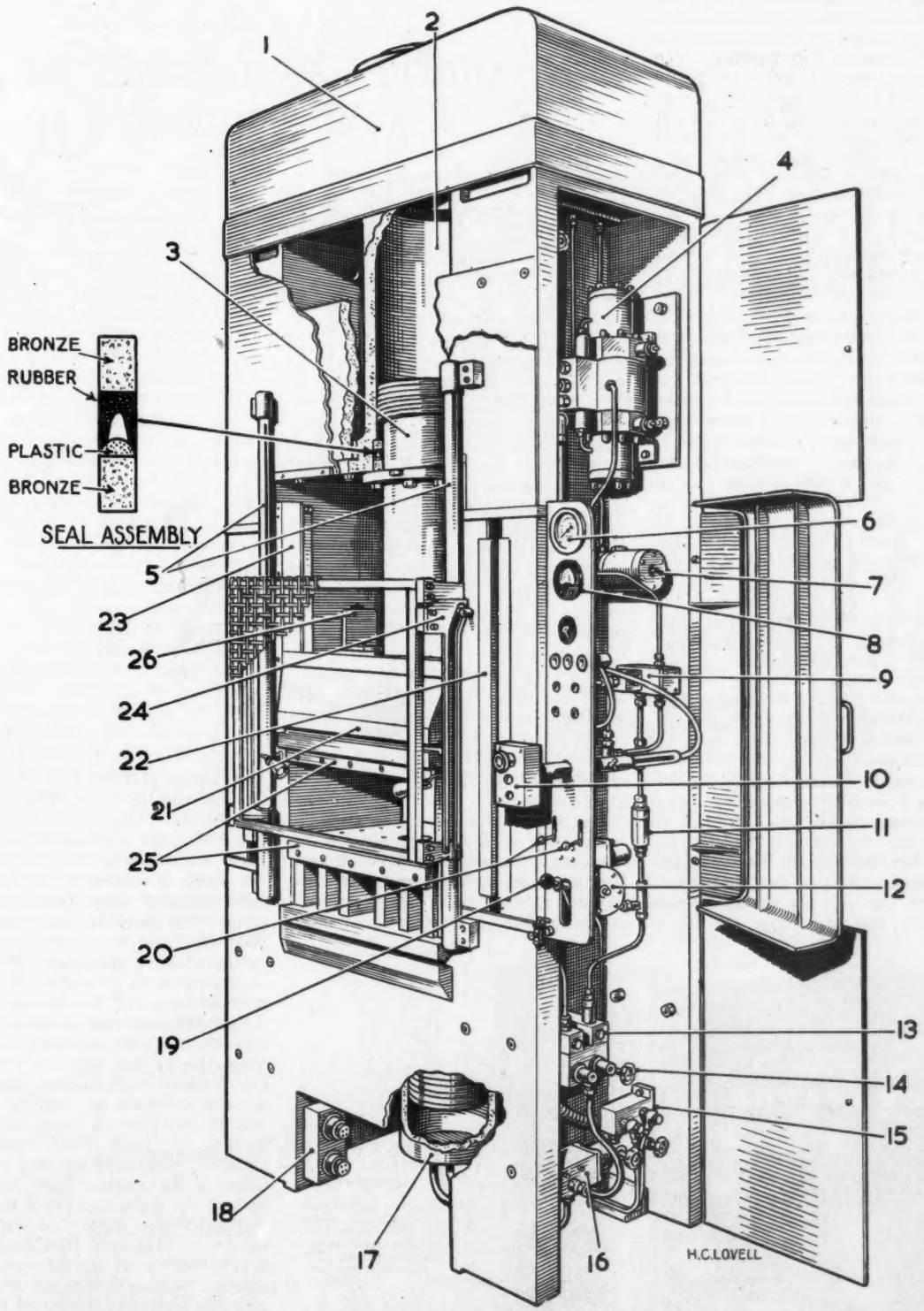


Fig. 2.—Auto-control "Bipel" press (B.I.P. Engineering Ltd.).

1.—Prefiller tank.' 2.—Main cylinder. 3.—Main ram, showing head and rings. 4.—Intensifier. 5.—Guide tubes for guard containing air pistons for raising guard (see detail, Fig. 3). 6.—Main cylinder pressure gauge. 7.—Delay valve for slow opening. 8.—Temperature indicator and selector switch. 9.—Slow close valve. 10.—Control panel for auto operation can be pulled out to suit operator's convenience. 11.—Non-return valves. 12.—Main control valve, air- or hand- operated. 13.—Manifold containing air-operated hydraulic valves to feed the intensifier and medium pressure, also hand-operated cocks to isolate press. 14.—Air inlet cock. 15.—Water inlet and outlet cocks. 16.—Air-operated hydraulic valve for transfer cylinder. 17.—Transfer cylinder and ram, showing piston rings. 18.—Power point for H.F. set, etc. 19.—Hand lever for main control valve. 20.—Hand levers to operate guard and transfer cylinder. 21.—Top table, showing horizontal Tee slots (also on bottom table). 22.—Horizontal-Tee slots (both sides). 23.—Adjustable guides for top table. 24.—Cam plate to operate interlock bar and scotches (see detail, Fig. 3). 25.—Water platens. 26.—Scotch (just visible, see detail, Fig. 3).

" dwelling " and " breathing." It consists of a revolving drum, graduated and grooved to take pegs which operate or cancel a series of trip switches. The function of each trip switch is clearly marked, and it is thus quite easy to slide the pegs so that they trip the switches at the required second to give the correct cycle. Any number of " breathes " may be obtained either before or after applying intensified pressure. Alternatively, the pressure can be applied and then cancelled for a set period. This " dwelling " is frequently used in the industry, particularly when moulding urea materials.

After the operator has loaded the material, he presses the starter button (10) which starts the cycle drum revolving. The " Guard Shut " switch is tripped and the guard closes. Immediately the guard has fully dropped, the " Main Ram Down " switch on the extreme left is tripped, allowing the pressure in the annulus to be released and the ram to drop under its own weight, until it is taken over by the slow close valve. As the ram drops it draws oil into the cylinder from the pre-filler tank.

The " High Pressure On," 100 or 150 tons, is then tripped to suit the requirements of the material. Pegs suitably placed on the drum cancel and re-trip these switches according to the number of " breathes " required.

For transfer jobs the " Transfer Ram Up " switch is tripped and pressure applied to the main ram at the appropriate moment.

A spare trip switch is provided for operating auxiliary pneumatic or hydraulic equipment.

After the cycle controller has performed the first part of the cycle, the switch marked " Clock In " is tripped. This starts the ordinary standard timer clock (35), and also stops the drum revolving. When the clock has run out its pre-set time, it re-starts the drum. Consequently cure can be increased or decreased without otherwise altering the moulding procedure set on the controller.

As the drum revolves, pegs cancel the " Transfer Ram " and " High Pressure," and operate the " Main Ram Up " switch.

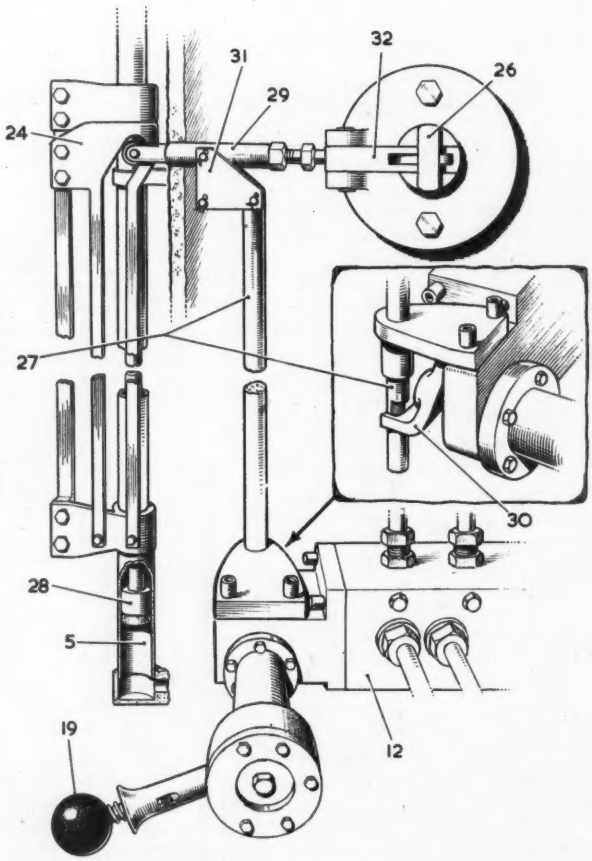


Fig. 3.—Details of guard mechanism.

5.—Guide tubes containing air pistons for raising guard. 12.—Main control valve, air- or hand-operated. 19.—Hand lever for main control valve. 24.—Cam plate to operate interlock bar and scotches. 27.—Interlock bar. 28.—Air piston to lift guard. 29.—Adjustable pull rod to operate scotch and interlock. 30.—Quadrant on main control valve operating shaft to co-operate with interlock bar. 31.—Bell crank lever to operate interlock bar. 32.—Bell crank lever to operate scotch.

This allows pressure into the annulus, thus opening the press. When the press is open the " Guard Up " and " Cycle End " switches are tripped, lifting the guard and stopping the auto-controller. The press is then ready to repeat the cycle exactly, as soon as the operator has removed the mouldings and reloaded with material.

This constant and exact reproduction of the moulding procedure set for any particular job has considerably reduced the percentage of rejects due to incorrect care or unskilled moulding procedure. Moreover, as the operation consists of merely removing mouldings, loading and pressing a button, the operator is often able to work two or more jobs which, because of their short cycle, have previously demanded one man per press.

Should the operator wish to stop the cycle at any point, he at once pushes the emergency stop button on the control panel (10). The press immediately stops at whatever point in the cycle it has reached. Nothing further can be operated until the timer has completed the cycle and timed itself out. Then, and only then, can the re-start button be operated, opening the press for the next cycle.

We are indebted to B.I.P. Engineering, Ltd., for permission to visit their works to make the drawings and for the technical description.

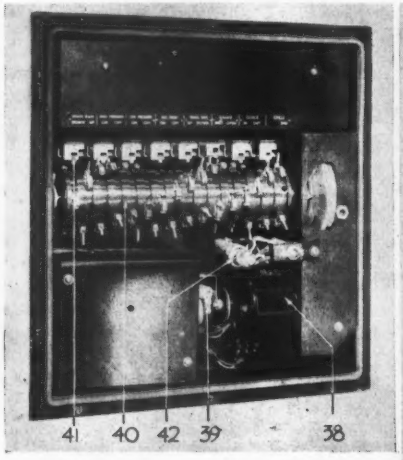


Fig. 4 (above).—Short and Mason Sequence Controller

38.—Synchronous motor. 39.—Brake. 40.—Cycle drum. 41.—Trip mechanisms. 42.—Pilot lamp.

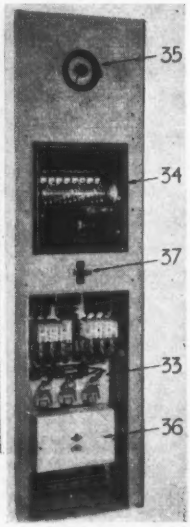


Fig. 5 (left). Electrical Control Equipment.

33.—Main control panel. 34.—Sequence controller. 35.—Process timer. 36.—Electronic temperature controller. 37.—Main isolator switch.

Successful Designing for Plastics Moulding—XIX

By W. M. HALLIDAY

BEADINGS may be successfully employed to achieve the dual purpose of stiffening the slender walls of a moulding, and to improve its external decorative appearance. The article seen in Fig. 1 had to be compression moulded in urea or similar thermosetting material, and the original design is shown at A. It consists of a tubular hollow container 'a,' at the upper end of which a cylindrical lip "b' of short length has to be provided to allow the hollow domed-cover 'c' to be snapped smartly on, a close fit being maintained between the two component parts. The cover 'c' is simply a hollow part carefully moulded on the internal diameter to fit on to lip 'b,' whilst the outside diameter of the member is made exactly the same as that of the upper largest portion of the container 'a.' When the cover is in position, the outside diameters of the two portions have to match up exactly and give a smooth, unbroken surface.

The shape is extremely simple and the cavity configurations in the respective moulds are easy to reproduce. Certain undesirable features, however, have to be noticed. In the first place, because of the very thin walls the cover member is slender and easily distorted out of shape. This distortion would be likely to occur during moulding, and also when the article is in use. From the point of view of a user, some difficulties would be encountered when removing the cover from the container body on account of the external surfaces being flush with each other. Very poor finger-gripping facilities are present to allow a user to grasp the cover and body comfortably and with necessary pressure.

Despite the pleasing conical curvature on the lower portion of the container body 'a,' and the slightly domed head of the cover 'c,' when these parts are assembled their appearance will be uninteresting. A bad matching of the cover with the container body, moreover, would result from the formation of flashings on these members. Referring to the cover, the mould would be parted along the line 'x'; that for the container would be parted along line 'y' with the large core plug carried in the movable mould block. Unless the flashings lying along these lines were carefully removed, instead of a sharp and clean-cut edge on each component to give a close match when fitted together, there would result ragged and snipped edges, giving uneven and unsightly matching.

When removing flash from the cover, no serious objections would be encountered, except that a considerable amount of material may have to be removed from the bottom (open) end face if thick flash were allowed to develop. With the container, however, care would be required to guard against cutting, shearing or otherwise marking the polished, smooth cylindrical surfaces immediately below the lip 'b.'

This projected design A was abandoned in favour of the one shown at B (Fig. 1). Here the cover 'c' is substantially the same shape as before, and it also has the same wall thickness throughout. To increase rigidity and resistance towards distortion, however, two beadings are employed, as shown at 'd' and 'e' respectively.

Beading 'd' is situated at the lower open end of the cover, and is semi-circular in shape (see upper half-sectioned view). The bead extends completely around the diameter and is blended smoothly by means of a small fillet to the domed curvature. On the closed end of the cover, beading 'e' is of very small height and is truly circular, being located concentric with the outside diameter of the part, as shown. In cross-section this beading resembles a cone with a rounded crest.

The presence of beading 'e' considerably increases the rigidity of the wall at the closed end, whilst beading 'd' serves to stiffen up the side walls and allow the cover to retain its true circular shape, even when firmly gripped by the hand.

The container 'f' is similarly modified by the introduction of a beading 'g,' located on the edge of the square shoulder formed between the lip 'b' and the short parallel outside diameter of the part below that lip. The outside diameter of this beading should be slightly less than that of beading 'd,' formed on the bottom end of the cover member, so that the latter bead will actually project beyond beading 'g.' This feature provides a shallow ledge on the cover when fitted in position on the container, thus giving simple means for gripping the cover when removing it from the container body. It will be noted, also, that the cross-section of beading 'g' is approximately quarter-circular, and that this element is blended to the lower parallel portion by means of a small fillet.

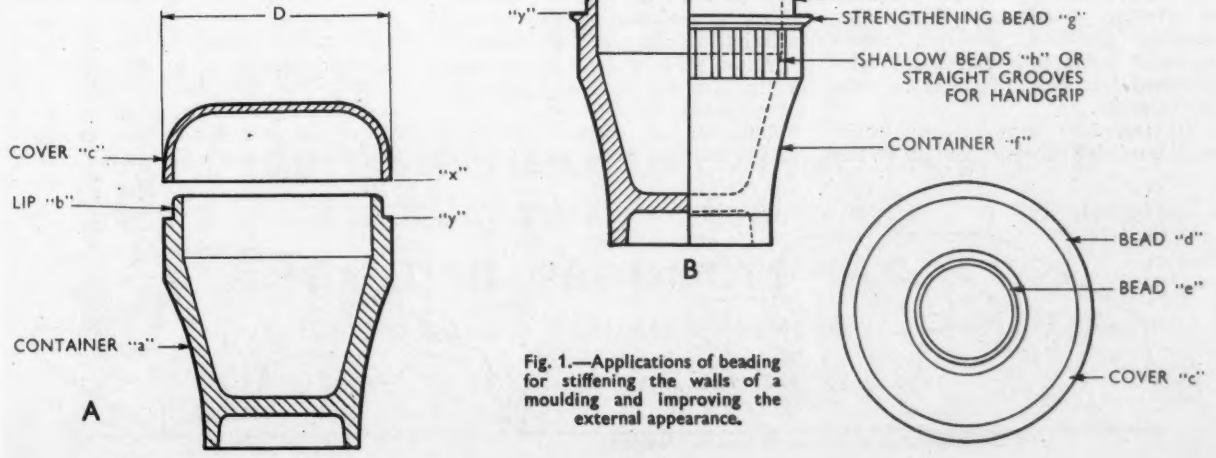


Fig. 1.—Applications of beading for stiffening the walls of a moulding and improving the external appearance.

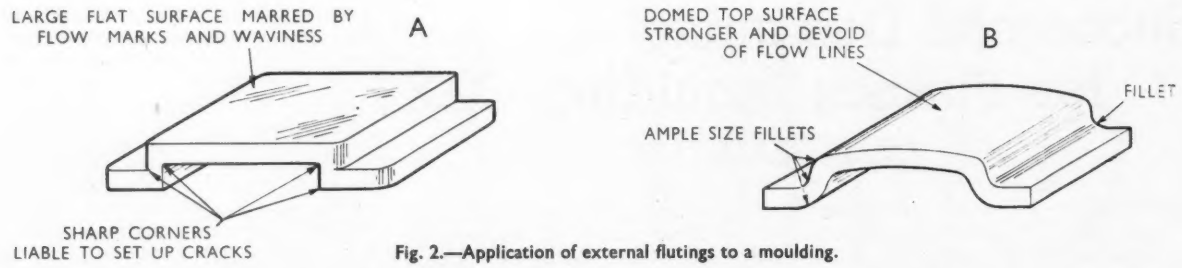

LARGE FLAT SURFACE MARRED BY FLOW MARKS AND WAVINESS
A
SHARP CORNERS LIABLE TO SET UP CRACKS
DOMED TOP SURFACE STRONGER AND DEVOID OF FLOW LINES
B
FILLET
AMPLE SIZE FILLETS

Fig. 2.—Application of external flutings to a moulding.

Line 'x' denotes the mould parting plane of the tool to produce the cover; it is along this line that any flash would occur. The mould for the container body would have to be parted along line 'y,' situated at the top edge of beading 'g.' Removal of flash along that edge would likewise be relatively simple and safe, in that all risk would be eliminated of cutting or damaging the polished surface of the body below the bead.

The beading 'g' will serve also to increase the rigidity and stiffness of the walls of the container at that open end, which would simplify the ejection of the part from the mould core plug, and later when being handled for trimming.

Still further to improve hand gripping on the container, as also to improve appearance, the short parallel portion immediately underneath beading 'g' is provided with a number of beads, as shown at 'h.' These are located equidistant all round the cylindrical portion of the body, and are truly axial with the vertical axis of the component, thereby being in line with the normal direction of opening of the mould blocks. They are very shallow, i.e., from .025 to .040 in. in height would be ample, and should be rounded slightly at the crest.

The provision of these raised beadings would be a comparatively simple matter, and would necessitate a series of very shallow grooves into the side of the mould cavity. Negative beadings in the form of shallow grooves could be provided on this exterior portion of the component, and as far as improving appearance and hand gripping these would prove equally as effective as raised beadings. One practical drawback, however, would normally forbid their use, i.e., greatly increased difficulties in forming the walls of the cavity.

To reproduce such grooves would require suitable raised projections on the sides of the cavity, and unless such a cavity could be "hobbed" from a male master plug, a considerably greater amount of machining and setting would be required, since the major portion of the cavity wall would have to be cut back to the required curvature, so as to leave the raised projections for forming the grooves. For this reason, therefore, reverse beadings are not often employed.

Generally, beadings having rounded crests or chamfered edges will be found the simplest to reproduce; they give best results in respect of strengthening the walls of the component, and in adding to appearance. Some designers mistakenly specify perfectly sharp edges and corners when beadings are intended to enhance decorative appearance. Beadings of this type, however, are prone to lose their original shape and clean-cut form much quicker than a rounded design; such knife-edged portions show a tendency to snip and leave rough and jagged edges even in normal handling or usage. Sharp knife-edges are also more difficult to reproduce, due to the fact that some thermo-setting materials have sluggish flow and thus do not penetrate too readily into sharp corners in the mould cavity.

The formation of cavity channels to produce sharp corners and edges on beadings may also present toolmaking difficulties. Not only are such channels difficult to machine, but a greater degree of care will be required when operating the keenly pointed cutting tool required for such purposes. As stiffeners for slender walls, sharp-edged beadings are not so useful, due to the fact that undesirable stress concentrations may be created in the internal structure of the beaded wall by reason of the unduly sudden changes in the direction of flow which sharp corners entail.

Flutes are very similar in shape and form to beadings, except they are usually much smaller. On the other hand, patterns or rows of flutes may be employed on a component surface, whereas the beading is generally used singly. Flutes are applied in connection with some plain unrelieved surface of the component, whilst beadings are located mainly at edges, or external sides of openings, cored holes, and the like.

Fluting

The fluting of surfaces on a moulded component is almost exclusively resorted to as a means for increasing the decorative values. This may be accomplished by using them to mask or hide minor surface irregularities and blemishes, such as scratches, "sinks," waviness and flow line patches. Flutes, also, may be adopted to relieve and break large flat surface areas which otherwise would lack interest.

Unlike ribs and beads, which occasionally may be located on an internal surface, flutes are almost always employed on an external surface. When used in conjunction with a rib situated, say, upon some internal surface, externally located flutes may be the means for arresting surface "sinks" and depressions arising from unequal wall section or resultant unequalized shrinkage of the walls.

Fig. 2 shows a good example of a component where external flutings could advantageously be employed. Referring to the example A, which is an unsatisfactory form, it will be seen that the middle portion of this component has to be substantially stepped out, whilst the top surface is perfectly flat and completely uninterrupted by holes, bosses, or other features. The large flat top surface of such a moulding would undoubtedly suffer surface blemish by reason of pronounced flow lines, and some waviness. Due to the fact that perfectly sharp corners are provided at all the points in the change of wall directions, considerable stressing would arise, and this in turn

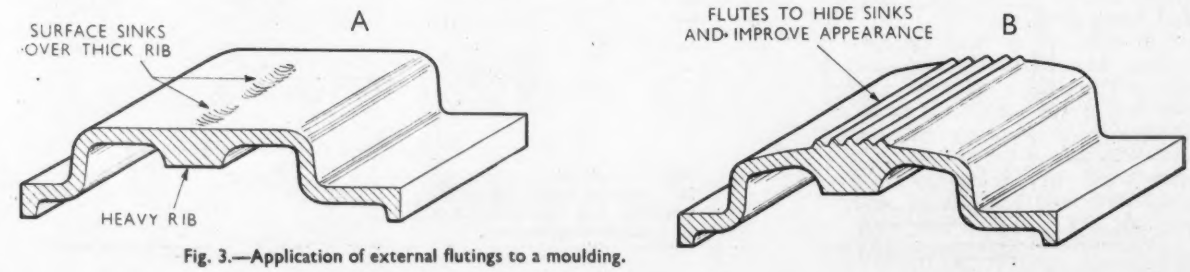


Fig. 3.—Application of external flutings to a moulding.

PLASTICS *in miniature for fighter aircraft*

The E.2.A. Aircraft Compass is made by Kelvin & Hughes Ltd. for the Ministry of Supply and was developed at the Admiralty Compass Observatory. It is a high grade instrument, used as a standard fitment on "Vampire", "Meteor" and other fighter aircraft both of the R.A.F. and the Navy, yet it weighs only 3 oz. and can be enclosed by a 2 in. cube.

The compass Bowl is moulded from clear "Diakon" thermoplastic material to a very high standard of clarity and dimensional accuracy. The moulding has a complicated shape, necessitating the use of a "split" mould; it has excellent transparency and high impact strength, making it an excellent example of the right use of moulded plastics. A representative will be very pleased to give details of the specialised knowledge and very large manufacturing capacity available for the production of moulded plastics at London and Birmingham.

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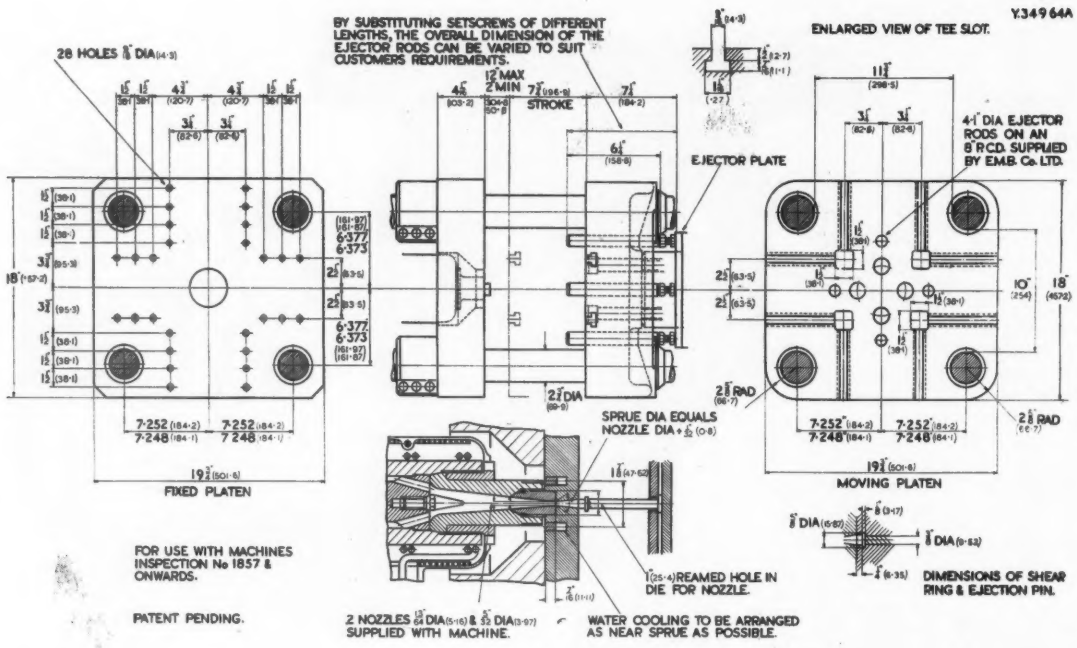
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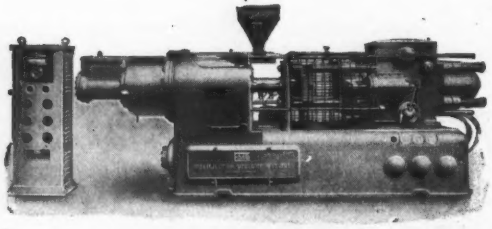
28 HOLES ⅝" DIA (14·3)
BY SUBSTITUTING SETSCREWS OF DIFFERENT LENGTHS, THE OVERALL DIMENSION OF THE EJECTOR RODS CAN BE VARIED TO SUIT CUSTOMERS REQUIREMENTS.
12" MAX 2" MIN STROKE
ENLARGED VIEW OF TEE SLOT.
EJECTOR PLATE
4·1" DIA EJECTOR RODS ON AN 8" P.C.D. SUPPLIED BY E.M.B. Co. LTD.
FIXED PLATEN
MOVING PLATEN
SPRUE DIA EQUALS NOZZLE DIA + 1/32 (0·8)
⅜" DIA (9·52)
DIMENSIONS OF SHEAR RING & EJECTION PIN.
FOR USE WITH MACHINES INSPECTION No 1857 & ONWARDS.
PATENT PENDING.
2 NOZZLES 13/64" DIA (5·16) & 17/64" DIA (6·97) SUPPLIED WITH MACHINE.
WATER COOLING TO BE ARRANGED AS NEAR SPRUE AS POSSIBLE.

Nº 9B INJECTION MOULDER



E.M.B. PATENT No. 9B INJECTION MOULDER

CAPACITIES

Linear — as above.

Weight — a good 4 ozs. per shot in cellulose acetate—and we mean really sound mouldings.

Output — as high as the material and die will permit.

Service — Machine has an inbuilt capacity for long periods under severe conditions with a minimum of attention.

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would cause the top surface of the part to become buckled or distorted, thus still further diminishing good appearance.

A much-improved form of component design is shown at B, where it will be noted that all sharp corners at the base of the various steps have been eliminated, and in their place the walls have been amply rounded by substantial radius fillets. Thus the sides of the cored-out step on the underside of the part are well tapered back and, unlike the sides of the step in the preceding example, have ample draft to simplify ejection from the mould.

Example A would have strong tendencies to stick on the core, as a result of which the walls of the part may be still further distorted and warped. With example B, instead of the upper surface being formed perfectly flat, a crowned or slightly curved surface is provided. This not only improves the surface appearance and light reflecting qualities of the article, but the wall at that point is also strengthened and made more rigid.

Curved surfaces of this kind will be found preferable where large areas are involved, especially when a parting line flash has to traverse across such a surface. Flashings located on such a slightly curved surface may also be removed with greater ease and far less risk of inflicting damage to adjacent smoothly polished moulded surfaces, than will be the case when flashings are situated upon large and perfectly flat surfaces.

This type of component is well suited for introducing flutings on the largest flat surface or, alternatively, upon the slightly domed surface. Fig. 3 indicates one simple and effective way in which such an improvement may be effected. The component shown is very similar in design to that depicted at Fig. 2, with the exception that a wide and thick strengthening rib is provided on the underside of the flat-topped wall section in the middle of the cored-out recess or step.

Referring first to A (Fig. 3), a cross-section is given in order to illustrate more clearly the character and location of this rib relative to the top surface of the part. In actual production, certain surface irregularities could be expected. These would mainly consist of "sinks" and depressions, occurring chiefly on the flat upper surface immediately above the heavy rib. Such "sinks" would most probably be distributed well across the width of the component as indicated, and would constitute a serious detraction to the appearance of the finished article.

Such "sinks," etc., would arise from the unequalized contraction forces occurring between the thin-wall sections on each side of the heavy centre ribbed-up portion. The solidification of the thin walls would tend to draw material away from the internal structure of the heavy centre portion, which would remain plastic for the longest time, thereby causing the upper surface to sink slightly to compensate for that drawing-off action.

Diagram B (Fig. 3) illustrates an excellent way in which the above tendencies and surface irregularities may be eliminated or, at least, satisfactorily hidden by the use of flutes running in parallel series across the domed top surface of the moulding. The sectioned diagram illustrates the shape of each flute and the most desirable form of "pitching" these members relative to each other.

Each flute is amply tapered on its sides, the height of each element is very small, and the crests are rounded. The flutes are pitched very close together, i.e., approximately twice the maximum width of each flute. The root of the valley formed between each pair of flutes is also rounded to avoid a perfectly sharp corner.

To a certain degree the presence of these five flutes will serve to stiffen the top wall considerably, and in such a manner as to resist the contractional pulls accruing from the shrinkage of the thick rib portion below the flutes. Further, should any surface "sink" occur thereon this would be well masked and far less visible and objectionable than with the previous non-fluted example shown at A.

When flutes are employed in a parallel arrangement of the above kind, small radius fillets of very small height should always be provided where they join the normal wall surface. The valleys between the flutes should be very shallow and well rounded in order to simplify buffing and polishing operations. If sharp corners are allowed at such points, polishing compounds may lodge therein and be difficult to remove. Any compound lodging at the root of flutes is likely to cause discoloration and further disfigurement of the finished article. Articles required for purely decorative purposes, and which have to be cleaned at certain intervals during use, will be maintained at their original high polish and clean-cut impression on such fluted portions, if sharp corners are avoided.

Flutings of the kind described will be extremely simple and inexpensive to reproduce in the mould cavity formations, and if sharp corners and edges are avoided, the task of polishing and plating the mould will be facilitated. They are often employed either in parallel arrangements or in other geometrical patterns; alternatively, they may follow on irregular line to conform to the shape of the component. Straight lines usually have the best appearance, and are the easiest to produce in the mould cavity.

(To be continued)

PATENT REVIEW

The following abstracts have been made rom specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2/- each.

B.P. 646,162. Appl. 30.9.47. Acc. 15.11.50.
Thermoplastic synthetic resinous materials. J. Lesser. To: Crystalate, Ltd.

Manufacture of sheets and articles from polymethyl methacrylate with a "granular" or "crystalline" surface. The material is granulated and formed under heat and pressure, cooled and subsequently re-heated with or without light pressure to a temperature of above 200 degrees F.

B.P. 646,166. Appl. 20.10.47. Conv. (U.S.A.) 19.11.43. Acc. 15.11.50.
Injection moulding machines. To: Lester Engineering Co.

Hydraulic ram type extrusion moulding machine which injects the material under pressure into a die cavity, exerts pressure from the opposite end and, after completion of the moulding cycle, extracts the finished moulding from the dies. The machine can be used for the production of articles from thermoplastic or thermosetting materials. Close temperature control is provided during the moulding process.

B.P. 646,170. Appl. 6.11.47. Acc. 15.11.50.
Phenolic resins and laminated insulating material bonded therewith. E. H. G. Sargent.

Use of morpholine as a catalyst in the preparation of phenol-aldehyde thermosetting resins used as bonding agents for laminated sheet materials. Improved electrical properties are claimed for the laminates. Used for laminating paper, textiles, glass cloth, etc.

B.P. 646,291. Appl. 1.8.47. Conv. (U.S.A.) 10.10.40. Acc. 22.11.50.
Manufacture of rubber hydrochloride film for packaging foodstuffs. To: Wingfoot Corporation.

Recovery of solvent used in the manufacture of rubber hydrochloride film, comprising the following steps: rubber is dissolved in the solvent, the solution is gassed with hydrogen chloride to form a rubber hydrochloride, film is cast from the solution, the solvent is condensed, distilled and, subsequently, reused.

B.P. 646,341. Appl. 25.10.48. Acc. 22.11.50.
Production of moulded articles. M. Biddulph. To: Universal Metal Products, Ltd.

Manufacture of hollow moulded articles such as bottles from thermoplastic or thermosetting materials. The articles are moulded in two parts, each part provided with a flange. As a final operation a sleeve of polythene or other material with a high coefficient of contraction is moulded over the edges of both flanges, thus securing the two mouldings firmly together.

B.P. 646,466. Appl. 13.1.48. Acc. 22.11.50.
Production of organo halosilanes. J. G. Fife. Comm: from Down Corning Corp.

Process for the manufacture of aromatic halosilanes comprises reacting a benzenoid hydrocarbon with a polyhalomonohydrosilane in the presence of aluminium chloride at a temperature above 250 degrees C. under sufficient pressure. See also B.P. 646,584 and B.P. 646,629.

B.P. 646,480. Appl. 11.3.48. Acc. 22.11.50.
Rigid containers with flexible linings for the transport of liquids. F. F. Jaray. To: Tanks and Linings, Ltd.

Manufacture of loose drum liners from polyvinyl chloride sheet material. The liners are provided with a neck which extends through the neck of the metal container, the material of the liner being folded over a rigid member of the neck and clamped in position by means of a taper ring.

B.P. 646,498. App. 7.10.46. Acc. 22.11.50.
Inflatable boats and method of making same and other inflatable articles. A. G. Luisada.

Manufacture of multi-sectional collapsible boats from rubberized fabric, plastic impregnated materials or plastic sheet material. Details of construction are provided.

B.P. 646,714. Appl. 21.7.47. Conv. (U.S.A.) 22.7.46. Acc. 29.11.50.
Polymerizing acrylamides. L. M. Minsk, W. O. Kenyon, J. H. van Campen. To: Kodak Ltd.

Method of polymerizing acrylamide or alpha-methacrylamide comprises heating the amide in a mixture of water and an aliphatic water-miscible alcohol having 1 to 4 carbon atoms in the molecule in the presence of a polymerization catalyst which is soluble in the mixture.

B.P. 646,715. Appl. 30.7.47. Conv. (U.S.A.) 28.11.39. Acc. 29.11.50.
Preparation of phenolic ethers and esters. To: Harvel Corp.

Treatment of phenol from "Anacardiacae" plants by substituting hydrocarbon radicals for the hydrogen atoms of phenolic hydroxyl groups or carboxylic hydroxyl groups occurring in the material. Applicable to manufacture of phenol esters from nut shell liquid.

B.P. 646,742. Appl. 30.3.48. Conv. (Switzerland) 2.4.47. Acc. 29.11.50.
Process for dyeing or printing superpolyamide fibres. To: Ciba Ltd.

Printing of nylon fibres with a water-soluble dyestuff containing acid groups together with a salt of a volatile base with a less volatile acid and/or a heat decomposable ester of an acid, as an agent capable of liberating acid when heated.

B.P. 646,769. Appl. 29.10.48. Acc. 29.11.50.
Colouration of cellulose acetate. G. D. Sutton and O. Boothby. To: T. E. Marchington and Co., Ltd.

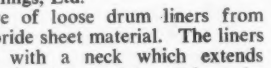
Dyeing of acetone-soluble cellulose acetate without saponification, using vat dyestuffs in the presence of sodium hydrosulphite which has been stabilized with an alkaline calcium compound. The pH value of the solution is betwen 10.5 and 11.4 before being added to the dye bath.

B.P. 646,781. Appl. 23.4.47. Conv. (U.S.A.) 10.5.46. Acc. 29.11.50.
Apparatus and method for injecting mouldable material into a mould. To: Chrysler Corporation.

Refers to B.P. 605,867 and describes an extrusion moulding press with a special telescopic nozzle system and hydraulic-electric control mechanism for filling the mould, shutting off the supply and withdrawing the nozzle after completion of the injection process.

B.P. 646,918. Appl. 24.2.47. Acc. 29.11.50.
Production of plastic masses, foils, films, coating compositions and the like. H. Jones and J. K. Aiken. To: The Geigy Co., Ltd.

Solubilizing and plasticizing agents for materials such as fully acetylated cellulose or cellulose triacetate of a combined acetic acid content of up to 62.5 per cent. A cyclic acetal containing the following grouping is incorporated in the plastic mass:



B.P. 646,954. Appl. 2.1.48. Conv. (U.S.A.) 1.3.47. Acc. 29.11.50.
Alkyl esters of alpha-cyano acrylic acid, and the preparation thereof. To: B. F. Goodrich Co.

B.P. 646,963. Appl. 9.2.48. Acc. 29.11.50.
Manufacture and production of artificial threads from viscose. J. Wharton. To: Courtaulds, Ltd.

Refers to B.P. 469,817. Object of the invention is the prevention of formation of rock-like deposits and incrustations on thread-guides, godets, etc., which occurs in the spinning of viscose from a bath containing a cation-active organic compound. This is achieved by the addition to the bath of a lubricating agent containing a free fatty alcohol.

B.P. 646,969. Appl. 17.2.48. Conv. (U.S.A.) 17.8.46. Acc. 29.11.50.
Process of preparing polymerization products in granular form. M. Baer. To: Monsanto Chemical Co.

Polymerization of an aqueous dispersion containing a vinyl halide in the presence of a hetero-polymer of vinyl acetate and maleic acid or maleic anhydride, the hetero-polymer being free from salt groups.

B.P. 646,970. Appl. 9.3.48. Conv. (U.S.A.) 30.4.47. Acc. 29.11.50
Resinous semi-conducting materials including conductive carbon. To: Westinghouse Electric International Co.

Manufacture of low-resistance compositions from carbon black and an artificial resin. A drying oil, phthalic anhydride, glycerol and carbon black are compounded to form the semi-conductive resistance material which is used in electrical machinery.

B.P. 647,045. Appl. 1.10.48. Acc. 6.12.50.
Radio-frequency parallel bonding. J. W. Mann and G. F. Russell.

Glueing of timber with a heat-activated artificial bonding resin. Activation is effected by means of high-frequency power, applied through corrugated electrodes on both sides of the article, in order to obtain a particular distribution of the high-frequency field.

B.P. 647,059. Appl. 6.8.47. Con. (U.S.A.) 25.7.40. Acc. 6.12.50
Stretching and laminating film. To: Wingfoot Corporation.

Device and apparatus for progressively stretching in a lateral direction a film of thermoplastic material by passing the film through a heating chamber with controlled temperature and cooling the stretched portions in order to control the amount of stretching.

B.P. 647,063. Appl. 1.10.47. Conv. (U.S.A.) 19.10.46. Acc. 6.12.50
Phenolic condensation products. To: B. F. Goodrich Co.

Manufacture of phenolic condensation products by condensing a phenol with an aldehyde or ketone in an acidic medium in the presence of a mercapto-substituted aliphatic carboxylic acid or a mercaptol or mercaptal thereof.

B.P. 647,081. Appl. 24.2.48. Conv. (U.S.A.) 18.4.47. Acc. 6.12.50.
Manufacture of thermosetting resinous compounds. W. S. Sloatman, Jr. To: British Industrial Plastics, Ltd.

Relates to resinous compounds for coating laminates based on non-alkylated melamine-formaldehyde resins co-reacted with polyvinyl acetal resins.

B.P. 647,109. Appl. 20.5.48. Acc. 6.12.50.
Production of sheet material. W. J. Fischbein. To: British Artificial Resin Co., Ltd.

Manufacture of continuous board from sawdust, etc., and artificial resin. The material is carried as a uniform layer on a conveyor belt; pressure is exerted through a caterpillar belt system and the resin is activated by means of heat generated by radiation or other means.

B.P. 647,111. Appl. 4.6.48. Acc. 6.12.50.
Polymeric hydrocarbon. F. W. Lord and L. B. Morgan. To: I.C.I., Ltd.

The condensation polymerization of p—phenylene ethylene.

B.P. 647,167. Appl. 9.7.48. Conv. (U.S.A.) 5.8.47. Acc. 6.12.50.
Organo siloxane polymers. J. F. Hyde and O. K. Johannson. To: Dow Corning Corp.

B.P. 647175. Appl. 13.8.48. Acc. 6.12.50.
Polymerization of ethylene. H. Newby. Comm. from: Universal Oil Products Co.

An organic peroxide polymerization catalyst is used in the presence of a saturated hydrocarbon diluent containing at least three carbon atoms and a metal such as magnesium, zinc, cadmium or mercury.

B.P. 647,212. Appl. 28.8.47. Conv. (U.S.A.) 4.9.46. Acc 6.12.50
Laminated structures. To: Bakelite Corporation.

Refers to manufacture of decorative panels. The surfacing material is an ester resin prepared by the reaction of a polyhydric alcohol with a diene monobasic acid having conjugated double bonds.

B.P. 647,220. Appl. 21.10.47. Conv. (U.S.A.) 8.11.46. Acc. 6.12.50.
Halogenated aromatic amine-formaldehyde dicyandiamide resin and process for making the same. R. T. Olsen. To: General Aniline and Film Corp.

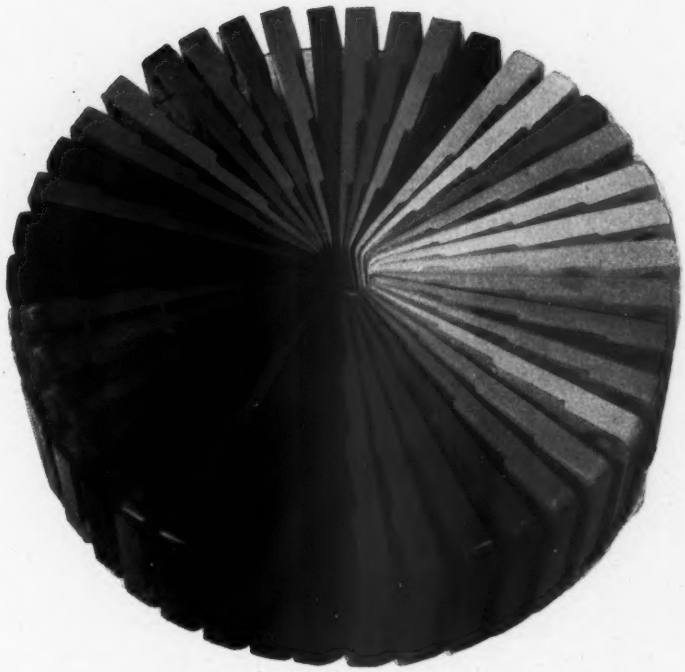
B.P. 647,222. Appl. 27.10.47. Conv. (U.S.A.) 8.11.46. Acc. 6.12.50.
Thermosetting polyaryl biguanide formaldehyde resins. A. L. Fox, H. L. Sanders and R. T. Olsen. To: General Aniline and Film Corp.

B.P. 647,226. Appl. 29.11.47. Acc. 6.12.50.
Plastic tubing and pipe lines. G. Haim. To: Communications Patents, Ltd.

Extruded plastic tubing provided with a co-axial cylindrical portion at the top which is suitable for receiving a suspension member such as a wire or the like. The co-axial portion may be continuous or interrupted at intervals to permit gripping of the suspension wire.

B.P. 647,261. Appl. 26.8.47. Acc. 6.12.50.
Manufacture of artificial teeth from plastics such as methyl methacrylate. R. J. Pile.

Moulding of artificial teeth from methyl methacrylate in a plaster mould. Heat and pressure are used to polymerize the material in the mould. Material consists of partly polymerized powder and liquid monomer.



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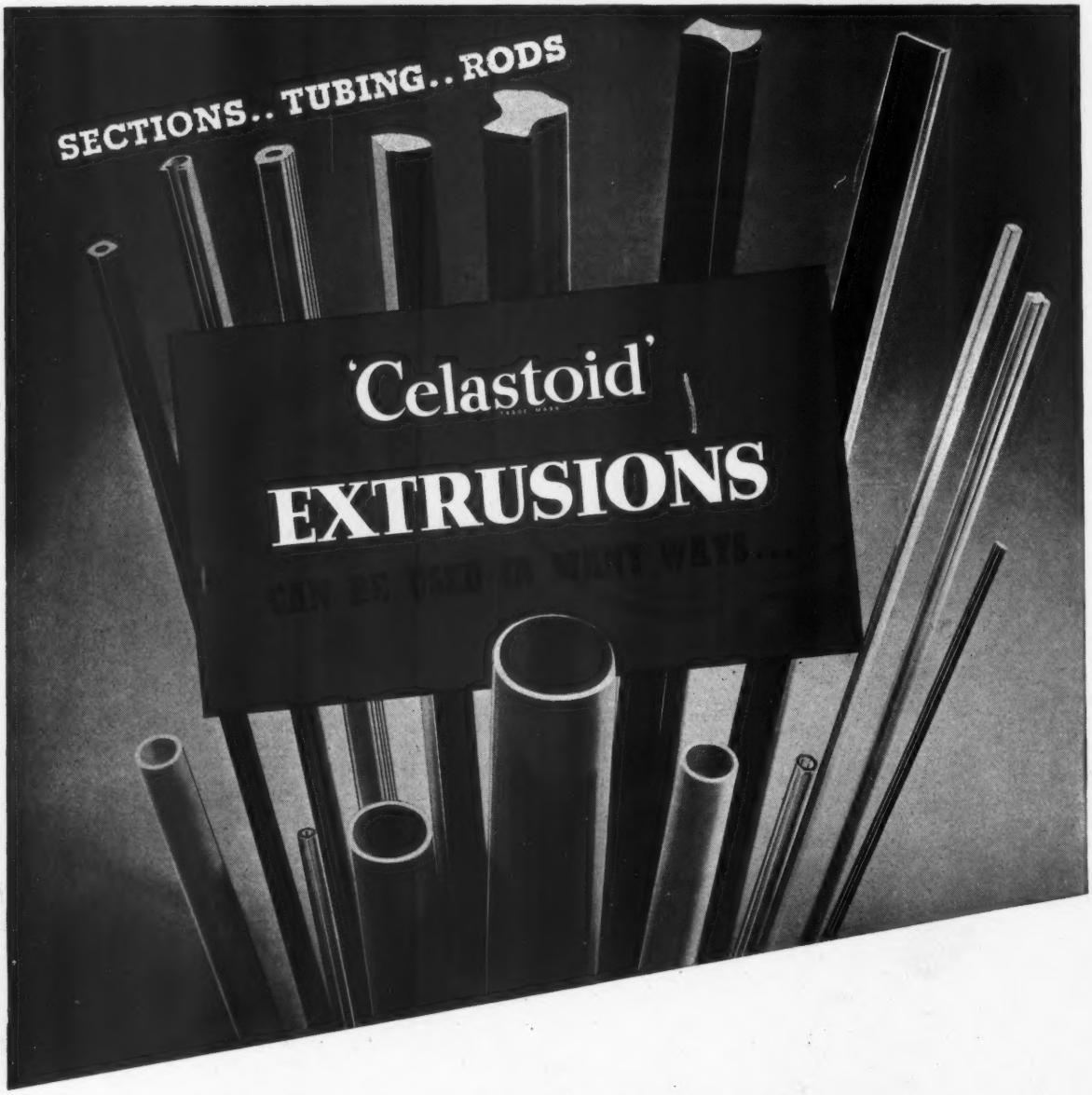

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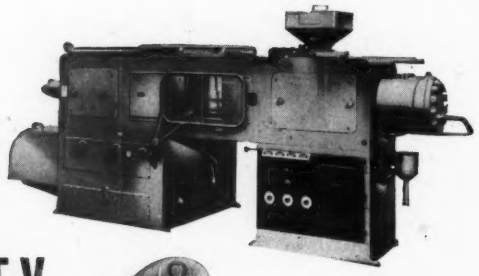

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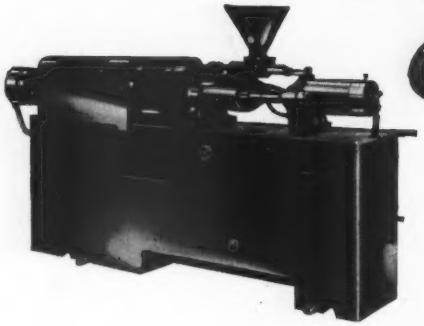

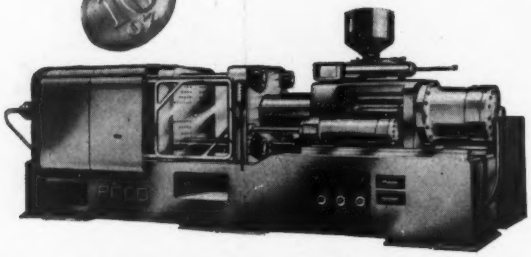

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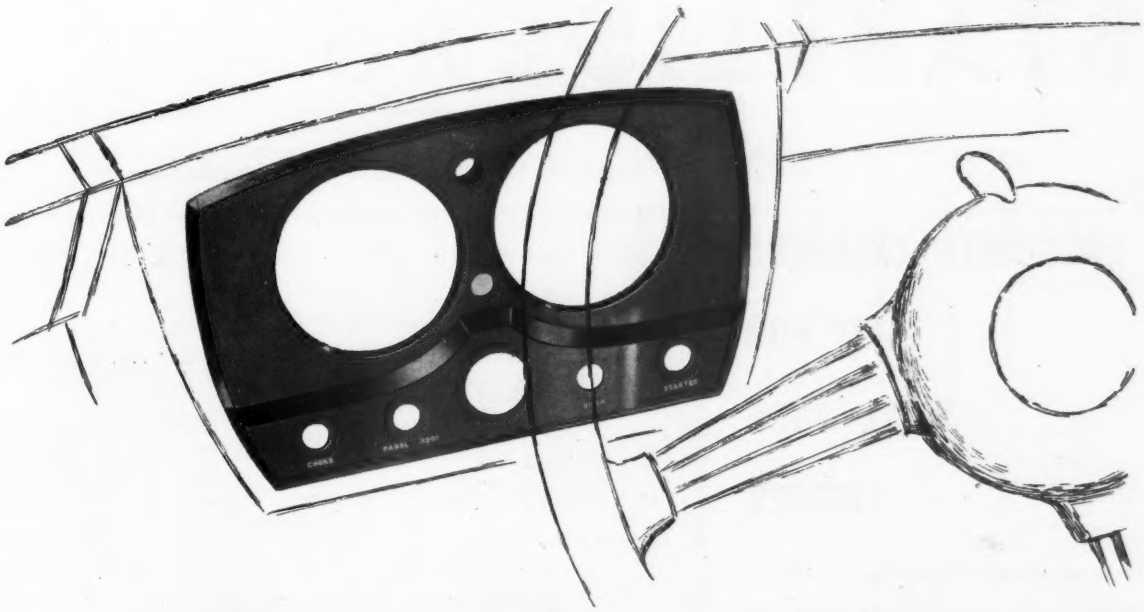

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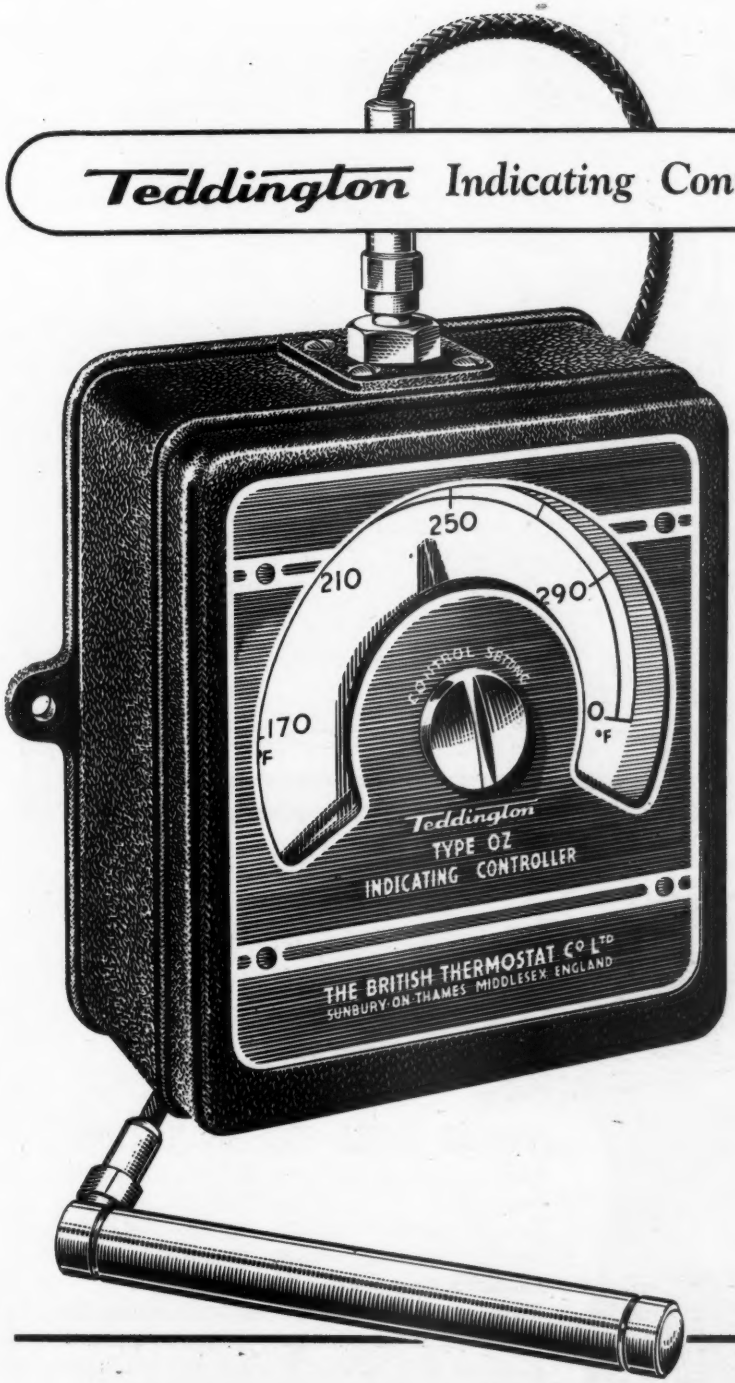

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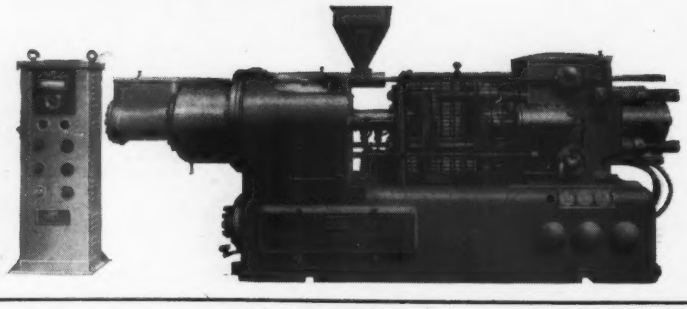

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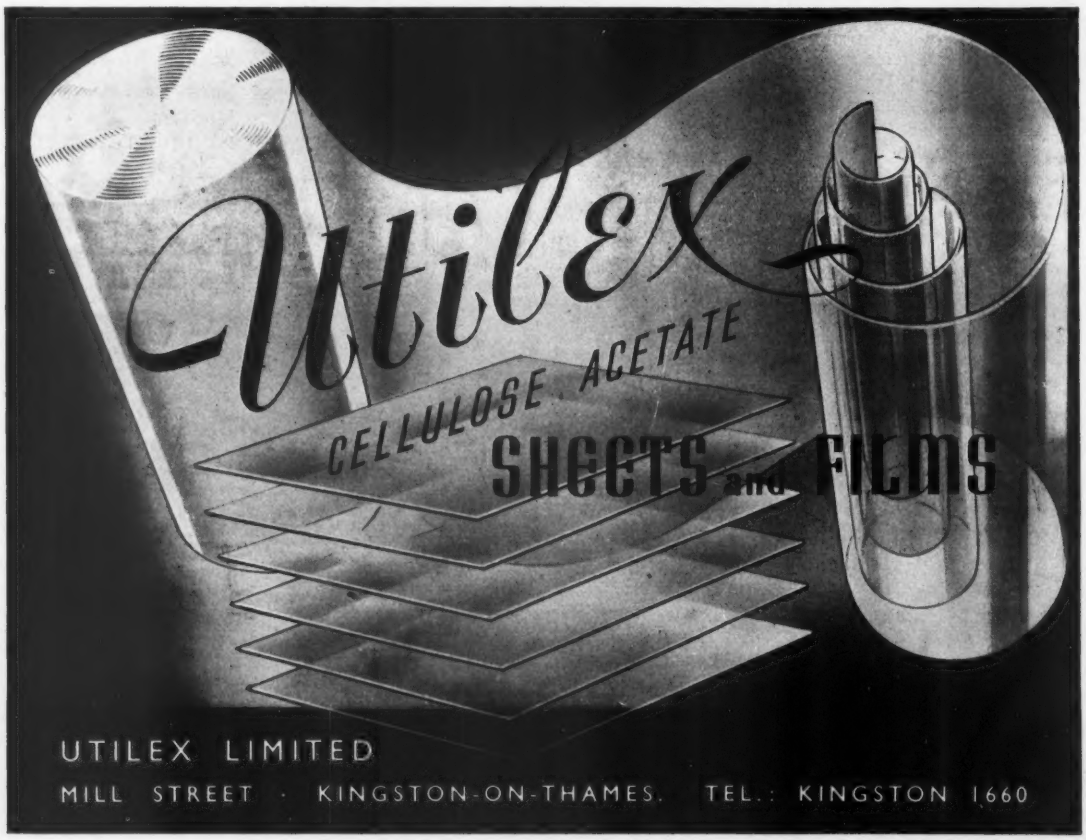

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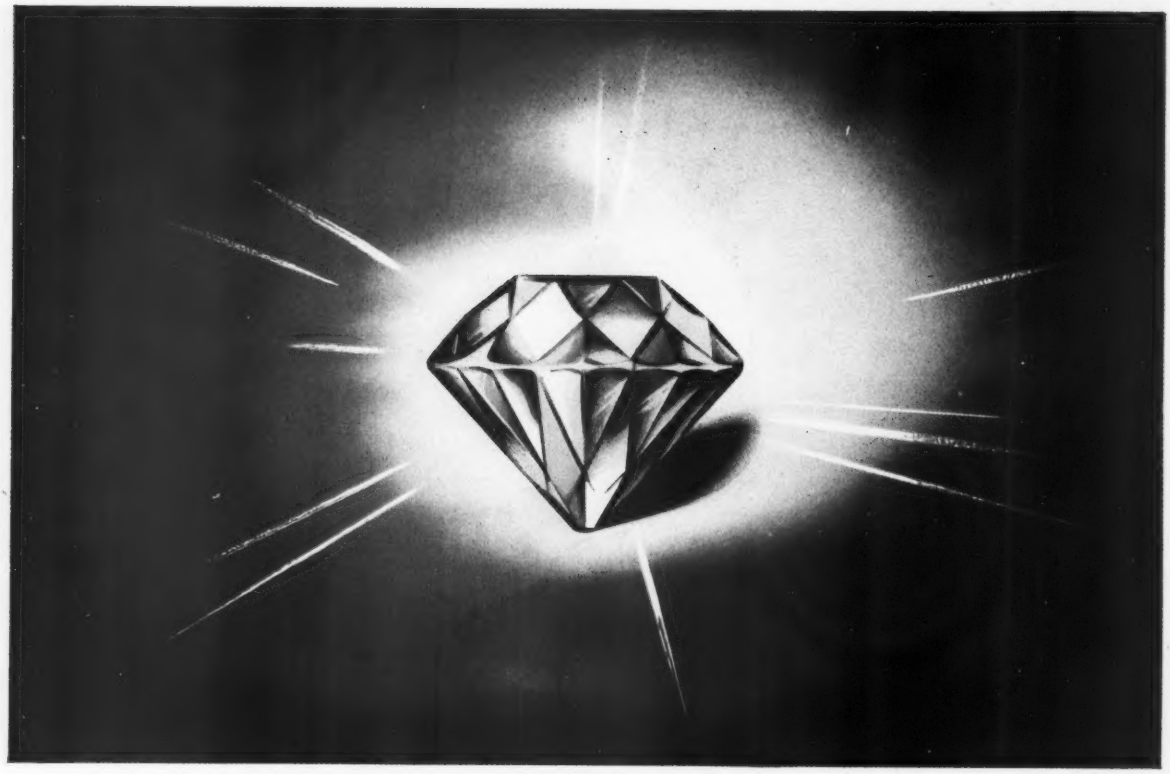

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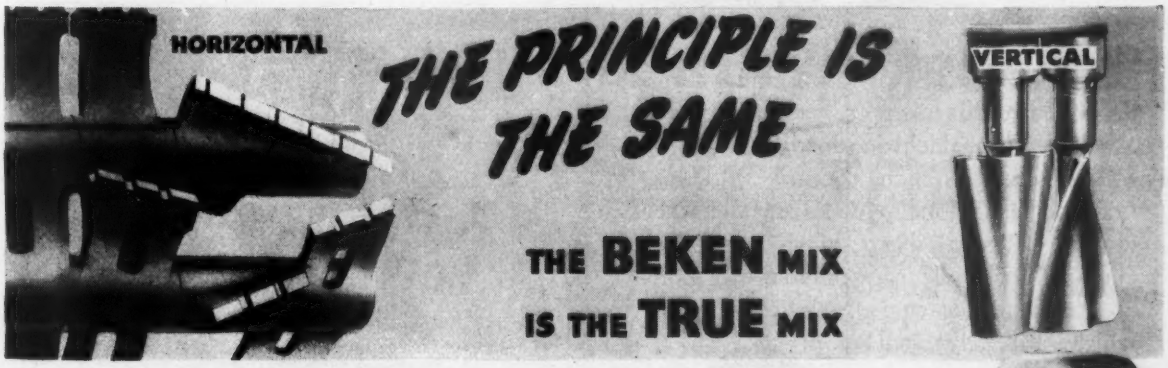

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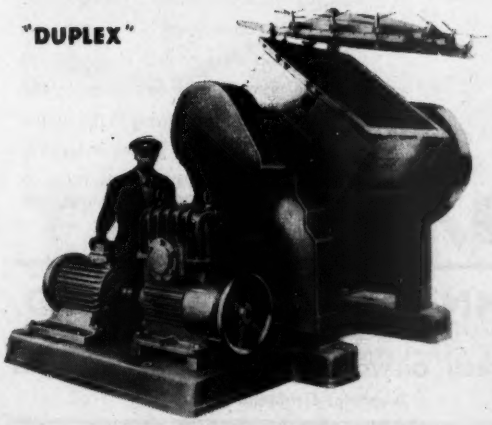

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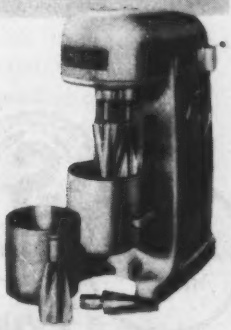

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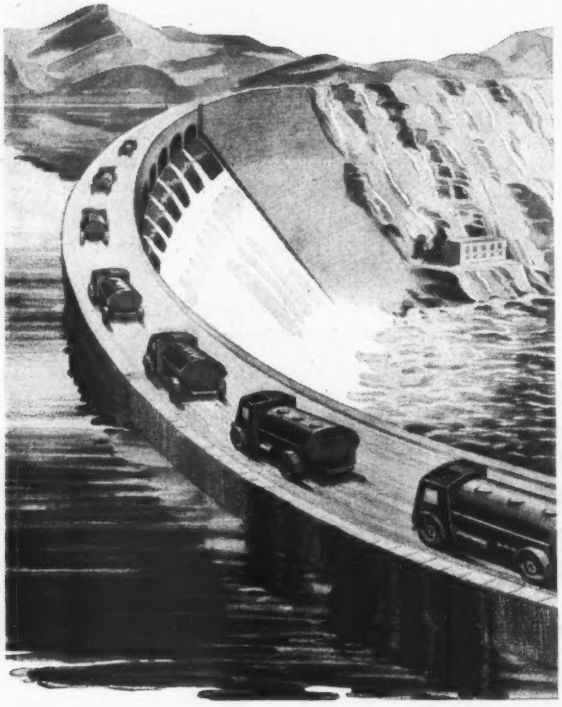

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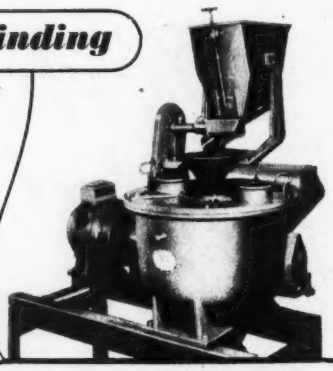

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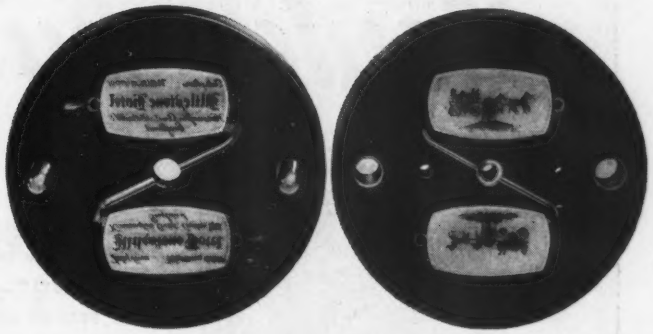

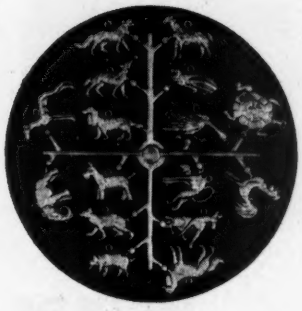

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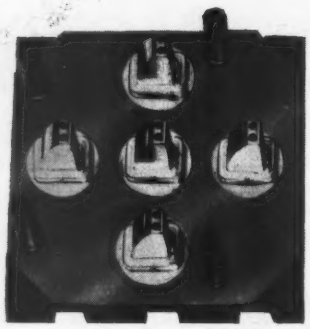

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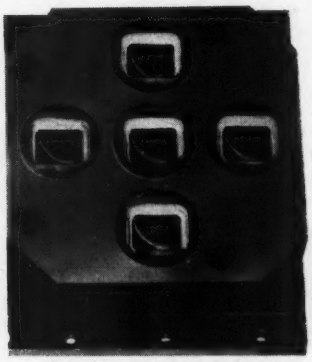

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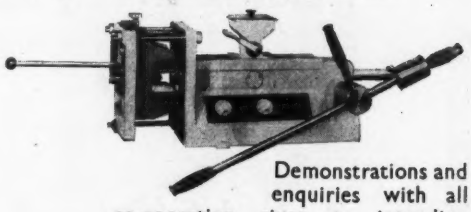

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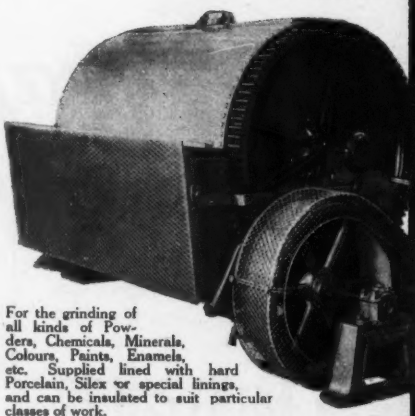

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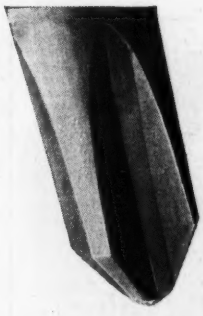

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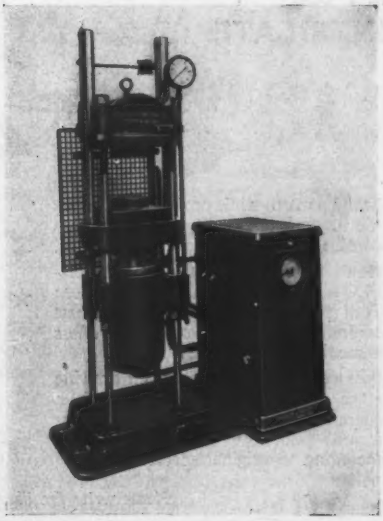

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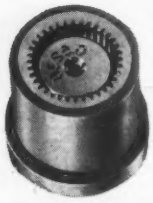

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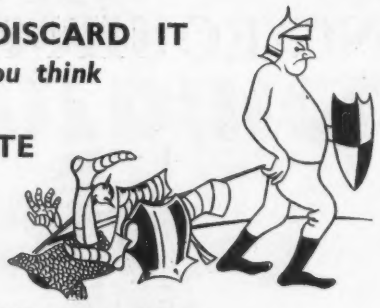

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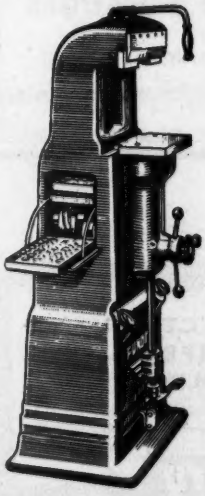

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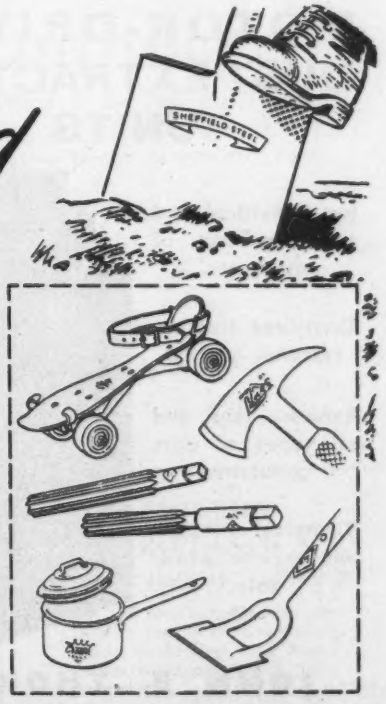

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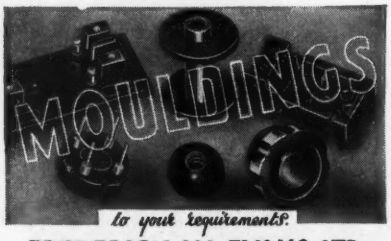

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FOR SALE, Tensile-testing machine by Avery. Specification and details from Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey. zzz-303

VIBRATORS and vibrating tables for hoppers, packaging, etc. Kolt Engineering, 70 Victoria Street, London, S.W.1. 165-12

DIAPLASTICS WELDER, type 47S1 by Applied High Frequency, Ltd., perfect condition, can be inspected in London. Box 508, care of George Murray (Advertising), Ltd., 184 Strand, London, W.C.2. 165-7

MACHINERY, TOOLS AND PLANT WANTED

8-OZ. MOULDING MACHINE, in good condition, any make. Box P648, care of "Plastics." 165-18

REQUIRED, second-hand injection moulding machines in first-class condition, capacity 2 oz., 4 oz., 6 oz. and 8 oz. Reply, Box P651, care of "Plastics." 166-2334

8-OZ. INJECTION MACHINE required. Box P633, care of "Plastics." 166-2338

PRODUCTION CAPACITY AVAILABLE AND WANTED

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PRINTING, ENGRAVING, ETC., all types of plastics. Modern Plastics, Ltd., Kangley Bridge Road, S.E.26. 166-2038

FAIRMAN PRECISION TOOLS AND PRODUCTS, LTD., of Horley, Surrey, have capacity for the manufacture of Bakelite and plastic moulds, diecasting, dies, press tools and special-purpose machines. Also all classes production machining. Phone, Horley 909. 172-2042

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RAW MATERIAL AVAILABLE AND WANTED

THERMOPLASTIC SCRAP. We are regular buyers of thermoplastic scrap, P.V.C., Polythylene, etc. Please make offerings to A. Schulman, Inc., 500 Fifth Avenue, New York, U.S.A. 168-2331

CLEAR AND COLOURED CELLULOSE ACETATE SHEETS for sale, all thicknesses. For home trade and export. Send your inquiries. Intrama, Ltd., Station Estate, Balmoral Road, Watford, Herts. zzz-293

THERMO-PLASTIC SCRAP AND MOULDING POWDERS of all types wanted. We collect and pay cash. Box P614, care of "Plastics." zzz-287

WANTED TO PURCHASE FOR CASH. "CELLOPHANE" CELLULOSE FILM SHEETS or rolls, 300, 400 and 600 SUB. Send samples with full details and prices. For sale: 1 ton 60-thou. transparent blue, green and smoke Acetate, perfect condition, 5s. per lb.
Allans, 37 Farringdon Street, E.C.4. Phone, Cen 5947. 165-16

Raw Material Available and Wanted (contd.)

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PAPER OR FABRIC laminate 1-32-in., paper laminate up to 2 mm. Any size. Box P656, care of "Plastics." 165-27

WANTED, Diakon moulding powder. Please quote grade, colour, quantity and price to Box P652, care of "Plastics." 165-33

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PERSPEX, clear, ⅛-in. sheets and offcuts, also clear scrap in quantities urgently required. Please offer to Herbert Connor, 45 Church Crescent, Finchley, London, N.3. 165-x06699

FOR SALE, Cellulose Acetate and Cellulose Acetate wire-weld sheets, black, thicknesses .060 in., .080 in., .120 in. Box 439, Williams's Advertisement Offices, Bradford. 165-x6888

LAMINATED PLASTIC SHEETS or offcuts required, about 1-32-in. thick, minimum width 1¾ ins., quantities up to 50 tons. Box P6518, care of "Plastics." 166-2336

SURPLUS OR REDUNDANT STOCKS will be purchased for cash. Any quantity considered. Send full details to The Brown Manufacturing Co., Ltd., 23 Kensington Park Road, London, W.11. 165-36

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PEARL ESSENCE (FISH SILVER) for mother of pearl finish for plastic industry. Representative of Bonda's Industry, R.C., Lovington, 189 Regent Street, W.1. 166-2332

WANTED, scrap transparent cellulose acetate in any form. Turnbridge Mfg. and Supply Co., Ltd., 52a-62a Longley Road, London, S.W.17. 165-9

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ERLANOS, LTD., 93 Aldersgate Street, E.C.1 (Monarch 4684), require Perspex and Cellulose Acetate off-cuts and scrap, clear and coloured, highest prices paid. 167-2083

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SITUATIONS VACANT

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PLASTICS TECHNOLOGIST required for important new development by company in South London area. Applicants should not be above 25. Minimum qualification Inter. B.Sc. Some knowledge of plastics essential. Salary according to age and experience. Particulars to Box P6512, care of "Plastics." 165-22

IMPORTANT COMPANY require young active salesman for plastic welding and pre-heating equipment. Must have experience in the industry. London area. Apply Box P6511, care of "Plastics." 165-23

ASSISTANT CHEMIST WANTED. Industrial research work and development of new inventions. Permanent progressive position. Apply Box P658, care of "Plastics." 165-25

INJECTION MOULDING COMPANY in S.W. London are requiring assistant to Works Manager. Applicants should be aged 23-27 years. Plastics experience not essential but engineering and drawing office knowledge desirable. Duties entail understudying in works office and dealing with staff, works records, etc. This position gives young man of energy opportunity to build up in growing company. Apply by letter in the first instance to Box P657, care of "Plastics." 165-26

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RESEARCH CHEMIST required for development work on a new polymerization plant in the N.W. The position offers an interesting combination of laboratory and pilot plant work, and there is considerable scope for new developments. The applicant should preferably have a B.Sc. or A.R.I.C., and salary will be in accordance with qualifications and experience. Full details to Box P654, care of "Plastics." 165-29

TOOLMAKER IMPROVER required for injection moulds, jigs, etc. Experience on injection moulds not essential. Please reply with brief details of experience, etc., to Injection Moulders, Ltd., Westmoreland Road, N.W.9. 165-30

MAINTENANCE FITTER required, experience in injection machine shop desirable but not essential. Please reply with brief details to Injection Moulders, Ltd., Westmoreland Road, N.W.9. 165-31

FOREMAN for injection moulding machine shop for permanent night shift—five-night week, London area. Please reply with details of experience, etc., to Box P653, care of "Plastics." 165-32

EXECUTIVE required with knowledge of Thermo-plastic materials to be responsible for production control and area sales in the Birmingham area. Good salary with prospects for the right man. Box P6420, care of "Plastics." 165-35

THE COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, INDIA,
invites applications for the posts of
(a) ASSISTANT DIRECTOR (CHEMICAL ENGINEERING)
and
(b) ASSISTANT DIRECTOR (PLASTICS AND HIGH POLYMERS)
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Supplementary information from High Commission of India, General Department, India House, Aldwych, London, W.C.2, quoting No. 4/55H. 165-10

PLASTICS TECHNOLOGIST required North-east Area factory; must be fully experienced formulation, manufacture, testing of thermosetting resins and moulding powders. Would be required on plastics problems and should have some knowledge moulding technique and tool design. Write stating full details, qualifications, to Box P6510, care of "Plastics." 166-2335

DRAUGHTSMAN required, fully experienced in compression and injection moulds, press tools, etc., by firm in Central London. Permanent well-paid post above usual rate for applicant with wide experience in above and other directions. Give full details age, past experience in date order, salaries received and salary required. All replies will be treated in strictest confidence. Box P641, care of "Plastics." 166-2337

TOOLROOM UNIVERSAL MILLERS AND DIESINKERS required for work on compression moulds for plastics. High salary and permanent posts for experienced men only. Details to Box P6516, care of "Plastics." 166-2340

DESIGNER DRAUGHTSMAN, plastic moulds, required, good salary and bonus. Apply, stating experience and salary required to Projectile and Engineering Co., Ltd., Stewarts Road, Battersea, S.W.8. 165-5

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EDITORIAL AND BUSINESS NOTICES

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